ELECTRIC RAILWAY JOURNAL

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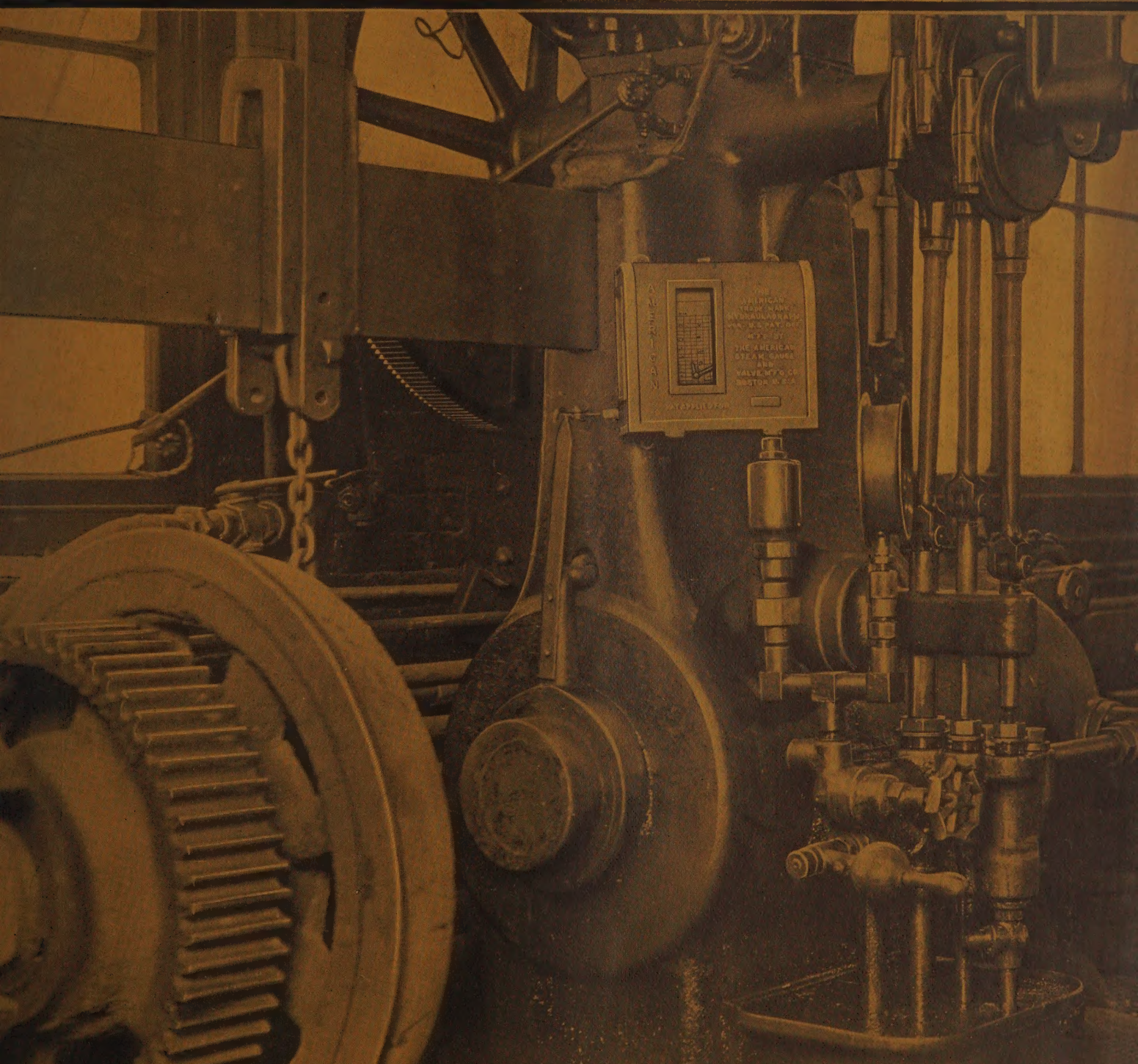
SEMINARY ROOM



This photo taken in the Sullivan Square Shops of the Boston Elevated Railway, shows a wheel press equipped with an American Hydraulagraph as assurance of properly fitted wheels.

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New York Chicago Boston Atlanta Pittsburgh

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The cars of the Lookout Mountain Railway are equipped with Westinghouse No. 306 Motors and HL Control.

No. 306 Commutating Pole Motor

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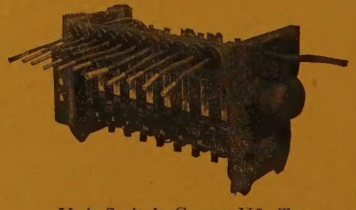

Unit-Switch Group HL Type

Westinghouse Electric & Manufacturing Co.

Sales Offices in
45 American Cities

East Pittsburgh
Pennsylvania

Electric Railway Journal

New York, August 1, 1914

Contents

New Rapid Transit Cars for London 198

This article describes the latest all-steel cars for the Metropolitan District Railway and the new center-entrance cars for the tube service of the London Electric Railway.

ELECTRIC RAILWAY JOURNAL, Aug. 1, 1914. 7 cols. Ill.

Subway Development at Buenos Ayres 202

The system is remarkable for the use of 1100-volts direct current, and the operation of the same cars for subway and street operation.

ELECTRIC RAILWAY JOURNAL, Aug. 1, 1914. 5 cols. Ill.

American Association News 213

Meetings of committee on way matters and joint committee on claim accounting result in foundation of recommendations. Convention exhibit plans making encouraging progress.

ELECTRIC RAILWAY JOURNAL, Aug. 1, 1914. 2 cols. Ill.

Communications 214

The Economy of First-Class Maintenance, Indianapolis as an Interurban Center.

ELECTRIC RAILWAY JOURNAL, Aug. 1, 1914. 5 cols.

Equipment and Its Maintenance 216

Rebuilding Summer Cars to Center-Entrance Type—*By G. M. Cameron.* The Practical Side of Vacuum Cleaning—Layout—*By S. L. Guthorn, E.E.* Equipment Defects—Fuses, Fuse Blocks and Fuse Boxes—I—*By G. W. Squier, E.E.* The installation of Grid Resistors, Motor Leads and Fuse Boxes—*By R. H. Parsons.* Radial-Axle Truck Adopted for Short Curves—*By Fred Steffens.* Diesel Electric Cars in Saxony. Electric Motor Trucks for City and Suburban Service. Reverse-Power Relays for Protection of Parallel Feeders. Poles for the Chicago, Milwaukee & Puget Sound Electrification. New All-Steel Cars for the Albany Southern Railroad. Combined Recording Barometer and Vacuum Gage.

ELECTRIC RAILWAY JOURNAL, Aug. 1, 1914. 18 cols. Ill.

Editorials 193
Separation of Freight and Passenger Operating Expenses Ordered 201
A Labor Paper on Municipal Ownership 204
Electric Railway at Constantinople 205
Maximum Length of Profitable Ride in Boston 206
Drive and Equipment of Electric Locomotives 207
Preliminaries to the Financing of Electric Railway Projects 208
Progress of French Electrification 215
Hydroelectric Development in Chippewa Falls, Wis., District 215
London Letter 225
News of Electric Railways 226
Financial and Corporate 230
Traffic and Transportation 234
Personal Mention 236
Construction News 237
Manufactures and Supplies 240

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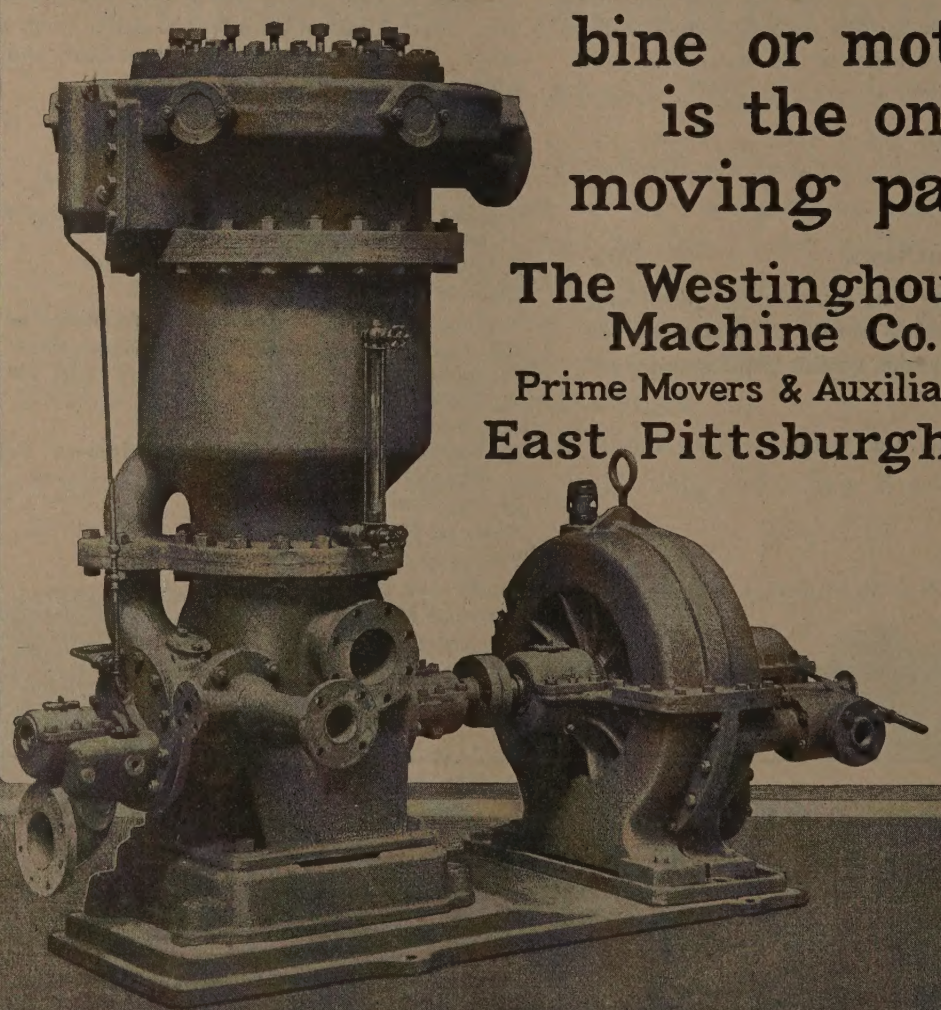

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East Pittsburgh, Pa.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIV NEW YORK, SATURDAY, AUGUST 1, 1914 No. 5

MAXIMUM PROFITABLE RIDE

The report on cost of individual passenger transportation in Boston, abstracted elsewhere in this issue, arrives at the conclusion that a 5-cent fare will permit a 4-mile ride for each passenger and just cover operating expenses, interest and depreciation. This rate of 1¼ cents a mile applies, of course, only to the conditions existing in Boston, and this rate could not be safely applied to any other set of conditions because of the effect upon the result of variations in the determining factors. If the average passenger is transported for his 4 miles in a badly under-loaded car, for example, it is hardly likely that the fare of 5 cents will prove profitable, and the same condition will exist if the schedule speed is unduly low, thereby limiting the effective work obtained from both car and crew. As a matter of fact it is probable that the latter possibility exerts a more potent influence upon profitable haul than the former, and for this reason the time basis really serves better for calculations and comparisons than the distance basis used, in this case, for Boston. Indeed, another of the large systems calculated some time ago that a twenty-two minute ride was the limit that could be given for a 5-cent fare, this, even under the high schedule speed of 10 m.p.h., being the equivalent of a distance of only 3.66 miles, while, with a 7-mile schedule speed, the profitable average haul is not more than 2.57 miles.

THE CONVENTION AND TECHNICAL EDUCATION

The American Electric Railway Association, through the committee on education, is calling the attention of the technical colleges to the importance of promoting a closer relation between the teachers and the industry. An obviously simple means to this end is to secure the presence of a large number of representatives of the schools at the annual conventions of the association. One cause for complaint of the results of technical education is that the teachers are not as familiar as they might be with the conditions under which their students are to work later. They are so occupied with formulas and principles that they lack the stimulus which comes from contact with the men who are doing things, and the students suffer thereby. At the convention the teachers might not see many differential equations, which they could safely forget for the time being, but they would see some very fine specimens of adaptation of scientific principles to practice, and would meet the men who have the ability to make such adaptations. We see no valid reason why it is not just as important for the colleges to send representatives from their faculties to the conventions as for the railway companies to do so. The cost would amount to something, but it would be easily returned in the improved quality of instruction which would result. In some respects October is an unsuitable month for teachers to leave their duties, but, on the other hand, the convention inspiration would come at a time when it would have the maximum effect on the school work of the ensuing year.

MODERN SINGLE-TRUCK CARS

A few years ago the single-truck car seemed doomed to die a natural death except in cities which were too small to use the large double-truck cars which were becoming more and more popular. No one would have ventured to foretell that the time would come when a large city company would actually discard double-truck cars in excellent operating condition for any kind of single-truck design. Yet this is precisely what the Third Avenue Railway System, New York, has done during the current year in ordering a total of fifty single-truck cars, of which forty-nine will have radial-axle trucks. In all likelihood additional cars of the same type will be ordered as soon as more of the older double-truck cars can be sold. The reason for this remarkable change of front is largely the radial-axle truck, which has made possible the selection of a convertible car body practically 35 ft. over all, a size which the operating company believes will prove ideal for service in the northern suburbs of New York City. This large order certainly shows that American operators are beginning to gain confidence in the principle of the radial-axle truck after a long period of experimental operation, especially on the electric lines of Great Britain. Mr. Steffen's article in this issue on his own recent design is another indication of the renewed interest in the radial-axle truck for moderate speed city service. Even the improved rigid-axle truck is still worthy of consideration. The determination of the Third Avenue System to replace heavy double-truck with light single-truck cars on its suburban lines is significant in many ways, but the one thing worth pointing out at this time is that the operator of a modern single-truck car has nothing to apologize for so long as that type makes ample service an economic possibility. The public must be educated to the fact that it would be as absurd for it to expect a metropolitan car in low-traffic service as to demand big-city standards in theaters and public buildings.

INFORMATIONAL CLEARING HOUSES

G. W. Lee, librarian for Stone & Webster, suggests that there should be created a central clearing house for knowledge on all subjects, to be located preferably in Washington. He calls attention to the present tendency of librarians to broaden their work in the direction of supplying information and believes that this indicates a need for a central reference bureau. As the principle underlying Mr. Lee's suggestion relates to the collecting and distributing of information of real value, it applies in the electric railway field if anywhere and is well worthy of consideration.

The ultimate source of knowledge is experience, but the amount of information which can be secured by an individual in this way is limited. Successful men must know much more than can possibly come within the range of their own personal experiences. Hence each man must spend time and effort in gathering for his own use the results of the experience of others. It is an obvious advantage if, when he does this, the results of his investigation can in some way be placed at the disposal of others. It is, in fact, his duty to do this in return for the help which he receives from other investigators. Suppose, for example, that the problem confronts a railway engineer as to whether it is advisable to creosote the ties in a certain stretch of track. The correctness of his conclusion depends upon his success in obtaining accurate and sufficient information based on the experience of others. His first step is to make a plan to secure this information. He consults the available reference literature and possibly writes to a few friends for their opinions. One source of information leads to another until finally he feels warranted in reaching a decision. The matter of creosoting ties, however, affects not only this one man but hundreds of others. He has done a great deal of work in getting certain information. It is a waste of time for the other hundreds to go through the same tedious process. If the first man had some easy way of filing his memoranda where they would be accessible he would undoubtedly be glad to do so.

At present this man, if he files his information at all, would probably do so with the appropriate committee of the American Electric Railway Engineering Association, the American Wood Preservers' Association, or whatever other society would be interested. This is good as far as it goes. It is possible, however, to imagine the libraries of the country to be so organized, with a central clearing house, that each individual would file his data with the local librarian, who would forward it to the central agency, from which it would be distributed to all libraries in the country. If then another railway man desired to know what there is to be known upon the subject in question, he could apply to any library with a reasonable assurance of success.

The apparent weakness of this scheme is that it depends upon voluntary co-operation. The librarian has a considerable responsibility at this point and, under the proposed scheme, it would be his duty to keep in touch with all research work being done in his territory. This kind of work may seem quite different from that which is ordinarily expected of a librarian, but the librarians of the country are different now from what they used to be. The librarian is coming to be depended upon more and more as a source of information, and the books and periodicals which he keeps in his library are simply a means to an end. In the State of Wisconsin, for instance, one important section of the University extension department furnishes all kinds of information to inquirers, and this is used not only to satisfy the desire for knowledge, but also in the preparation of public addresses, debates, etc. The same principle could be applied on a larger scale for the whole country.

As Mr. Lee suggests, a movement for a central index bureau ought to be inaugurated by leaders in the library field, but it will take time to initiate this movement. In the meantime this paper will be glad to act as a clearing house for information relating to electric railways and will systematize the filing of such data of this kind as may be sent to it, so that the information will readily be accessible to subscribers. The editors believe that this is a part of their duty to their readers.

STORAGE BATTERY CAR LIGHTING

A feature of modern car equipment which illustrates the attention now given toward attaining the ideal of safe service is that of using storage batteries to insure the illumination of several emergency lamps at least. Doubtless the need for such an auxiliary is most acute on third-rail interurban lines operating single cars, where the absence of a train bus line means an annoying interruption of the lights at every grade crossing. A further advance is the introduction of electric marker and tail lights, which, from their character, should be connected to a storage battery rather than to the line. All will admit that an oil lamp is a decided anachronism on an electric car, but safe operation demands its use unless the supply of electricity is certain.

An excellent scheme in service on a large single-phase electrification in the United States is to keep the headlights, marker and tail lights in permanent, and a set of inside lamps in emergency, connection with a 32-volt battery. Again, where the multiple-unit control is operated with a storage battery, it has been found feasible to use it for a few emergency lights inside the car, if not for the operating purposes already named. A still wider use for the storage battery, however, lies in its application to the possible continuous supply of all the car lamps. Such an application was described in connection with the new cars of the Michigan United Railway in our issue of July 18.

For electric cars with the overhead system of line supply this plan may seem an unnecessary refinement. Nevertheless, with interurban lines the variations in voltage which are almost inseparable from operation will produce corresponding variations in illumination, and in such instances a storage battery system will insure an adequate supply of illumination for less money than additional feeders. Furthermore, the increases in

lamp efficiency and the decreases in battery weight so characteristic of recent years make the matter of extra weight of less importance than in the past.

COMPARATIVE COMMENT ON ENGLISH ALL-STEEL CARS

That the advantages of all-steel construction for electric railway cars have not been overlooked by European managements is shown by the description of two new rapid transit cars for London, published elsewhere in the issue. Both cars are intended for heavy, high-speed service and both are designed to haul trailers, so that the installation of 460 hp of motors on each car is not surprising. The fact that in each case this motive power is concentrated in two motors on one truck is, however, hardly in accordance with the trend of American practice, considering the comparatively small size of the car bodies, as is also the fact that the two cars, although they are being purchased by the same interests, display striking dissimilarities in fundamental design. It should be said, however, that each is an evolution from the types existing on the line for which it is intended.

It is of course difficult to subject to analysis types of construction that originate so far away as in England, but it is even more difficult to pass without comment the obvious inference that is to be drawn from a comparison of the two designs, one of which exemplifies the principle of the "house on the flat-car" that American designers are reluctantly beginning to give up.

The car in question is the one intended for the Metropolitan District Railway. Reference to the halftone of the framing which accompanies the article shows that, notwithstanding the superstructure of steel, the strains imposed by the load are obviously carried only by the floor framing, truss-rods even having been installed regardless of the incongruity of such a makeshift. The result is a car body 49 ft. long that weighs, fully equipped but without trucks, 43,680 lb. On the other hand, the car for the London Electric Railway, with 1 ft. more over-all length, has a body weighing but 34,000 lb., making it nearly 10,000 lb. lighter than the Metropolitan District Car which was, presumably, designed for use under generally similar conditions.

The reason for this extraordinary difference in weight is by no means obscure. The London Electric car is sheathed with ⅛-in. steel plate, and this permits the strains to be carried above the floor at least as high as the belt rail and possibly to the roof, the side sheathing acting as a girder to support the load as well as to protect the passengers within the car. By this means the shallow and heavy sills required by the old-style underframe are eliminated, and the weight of the body is obviously reduced to a marked degree. Indeed, it would be difficult to find a more striking practical example than these two cars of the utterly useless weight involved by adherence to the "house on a flat-car" school of design.

However, the mere adoption of sane principles of car construction does not cover all that can be accomplished in eliminating unnecessary weight. Even the lighter one of the two London cars, with its 50-ft. body weighing 34,000 lb., is still some 10 per cent heavier than is deemed necessary for similar service in this country. The body of the standard car of the Hudson & Manhattan Railroad is 48 ft. long and weighs fully equipped 30,000 lb. Even when the weight of the London car is scaled down to allow for its extra length, the Hudson & Manhattan car body is still 2600 lb. lighter. In view of the fact that the Hudson & Manhattan service could hardly be exceeded in severity and that the cars have withstood this service for nearly six years without the least sign of failure, this comparison of weights certainly redounds to the credit of American methods of design.

THE PROBLEMS OF THE INCLOSED PLATFORM

Anything which requires a change of habit on the part of the public is bound to create at first a feeling of dissatisfaction. Therefore it is not surprising to find in a number of cities a good many objectors to the closed-platform car. A newspaper account from St. Louis tells of a recent incident in that city in which ex-Governor Francis of Missouri was the principal actor. He reached a car with the intention of boarding it just after the door had been closed and as the car had begun to start. As he could not get on board he follow the car a block, only to repeat his previous experience in regard to losing the car but in time to break the glass of the door with his cane. He then ran after the car for another block where he boarded it and, as he paid his fare, gave his card to the conductor and asked him to tell the superintendent that he had broken the glass intentionally.

Governor Francis is probably one of those men whose only objection to the fully-inclosed car is that they cannot get on the car when it is in motion. Probably others who have missed a car under the same circumstances have felt the same way that he did but have not had the courage to break the glass. A few moments of thought, however, upon the reasons of the railway company for inclosing the car platform ought to convince such people that the plan is one adopted for their own good. With the rising generation it may be possible to inculcate a respect for this safety precaution, but with the older generation, many of whom learned the trick of boarding a moving car in the old horse-car days, the habit is still strong, and it cannot be stopped except by the fully-inclosed car.

While we are strong advocates of this type of car, we believe that companies would do well to adopt one or two precautions with it which were not necessary with the old type of car. One is to instruct the motormen and conductors to be more observant of passengers waiting to board the car than when the old form of open platforms was used. As we said recently in these columns, it is exasperating for a passenger who is on a corner ready to board a car to be unable to do so because the conductor is looking the other way and cannot be hailed because the platform is inclosed. The short-

haul passenger is particularly one whom the railroads want to get, but a number of experiences of this kind will encourage many possible short-haul passengers to walk rather than ride.

COMPENSATION INSURANCE IN NEW YORK

The announced decision of the Brooklyn Rapid Transit Company to insure its own workmen under the new workmen's compensation law on the ground that the premiums demanded by the State fund or by insurance companies would be prohibitive, is of vast interest to the electric railways of New York State. The Interborough Rapid Transit Company, the New York Railways, the Third Avenue Railway and the New York & Queens County Railway have also decided to insure their employees themselves, while the International Railways, of Buffalo, has accepted insurance in the State fund. Of the three methods provided to insure the payment of the compensation fixed by law, it cannot be said that the third, insurance in a stock company, is making a winning appeal to electric railways. One reason for this may be the higher rates charged.

A comparison of the minimum base rates for stock and mutual companies in New York and near-by States shows that the New York rates are appreciably higher. The New York rate for these companies per $100 of payroll for urban or interurban railroad construction (with or without the installation of electric equipment or pole lines, and without blasting, tunneling or bridge building), is $4.37 as compared to $3.38 in Massachusetts and $2.70 in New Jersey. The rate for all urban electric railway operation in New York is $3.24, in Massachusetts $2.20 and in New Jersey $2. For interurban operation the New York rate exceeds that in Massachusetts, but is less than that in New Jersey, the rates being as follows: New York, $5.18; Massachusetts, $5, and New Jersey, $9.37. Subway construction rates (open cut or cut and cover or tunneling) are $13.28 for New York; $7.50 for Massachusetts, and $11.50 for New Jersey. The rates for elevated railway operation, however, are only $3.24 in New York, as compared to $3.50 in Massachusetts and $5 in New Jersey. It is stated that the New York rates are based as far as possible upon actual experience gathered from Massachusetts and other States already operating under workmen's compensation laws and that adjustments have been made only to conform to the increased benefits provided under the New York law.

The base rates quoted above may be reduced for merit rating. To employers who pay attention to accident prevention, whose plants have been inspected, and who will show a favorable record of accident experience, a reduction will be allowed to the extent of 40 per cent, depending upon the physical conditions in the manufacturer's establishment and upon his record of accident experience. This maximum allowance is four times as great as the employers in Massachusetts receive, and it is asserted by the State insurance department that the attainment of this maximum reduction would produce relatively a lower cost for compensation insurance in New York than in Massachusetts.

The State fund rates were originally fixed on a basis of a reduction of 8.39 per cent below the above quoted minimum rates for the stock and mutual companies, but already the compensation commission has authorized an investigation by its actuarial department to report prior to Aug. 1 on a compilation of base rates as much lower than the stock company rates as is consistent with the maintenance of a solvent insurance fund. Estimates as to this reduction run as high as 15 per cent, which would mean that the stock companies' minimum rates would be at least 23 per cent above the equitable rates for compensation risk. Whatever reduction materializes from this investigation, however, it must be granted that it is perfectly feasible for the State to give lower rates than do the stock companies, for the latter must pay solicitors' fees and stockholders' dividends. Under the State fund no such expenses exist, and during its operation for the first two and one-half years the cost is to be met out of the State treasury. Another attraction that the State fund possesses as compared to insurance in a stock company is that the former provides by law an absolute release from liability for the payment of compensation after the premium is paid, whereas employers insuring in a stock company are liable for the continuance of the compensation payment in case of bankruptcy.

Insurance in the State fund and self-insurance are not susceptible of such concrete comparison as given above, but the action of the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company is mute evidence of the belief that self-insurance in the end may be cheaper than insurance in the State fund for companies with a large organization and extensive resources. For years these companies have been paying compensation to their employees where no liability existed as a part of their welfare work. Then, too, in order to investigate passenger injuries and claims they have developed departments that can with ease and with little additional clerical expense handle the compensation work. The only difference lies in the State fund's provision for medical attention, but the high standard of the Brooklyn Rapid Transit medical inspection bureau and the thorough provisions recently adopted by the Interborough Rapid Transit Company for the medical care of its employees make it doubtful whether the employees would be better cared for under medical attention provided by the State.

One of the most difficult problems, and one that formerly caused great diversity of opinion in regard to self-insurance, is that of providing the proper payments to employees in the event of the bankruptcy of the employer. The fact that compensation payments may extend over a long series of years makes this point of vital concern to the employee and to his family. Ample provision for this point, however, seems to be made in the New York State law. Self-insurers must prove to the compensation commission that they are financially

SEMINARY ROOM. MECHANICAL ENGINEERING DEPARTMENT

responsible and must file with the commission, to insure faithful discharge of any liabilities, high-class securities in an amount equal to the semi-annual premium in the State fund, less 10 per cent. This latter amount must be deposited in cash with the commission for use in the case of any immediate call for compensation payments. In the case of any death resulting in compensation payments, self-insurers must deposit immediately the full amount estimated to cover the risk involved to maturity. In some cases this might require a lump sum deposit of from $15,000 to $20,000.

The compensation commission recently made an interesting announcement to the effect that if electric railways should come into the State fund they would be put in a group by themselves in order to derive the benefit from their own experience and not have their rates loaded with the risks of more hazardous occupations insured in the State fund. For a group of companies having 3000 employees and a payroll of $3,000,000, this is probably the most satisfactory method of insurance under the new law.

"PROCEED, PROTECTED BY FLAG"—A FALLACY?

The numerous installations of automatic block signals by electric railways during the past year have resulted in focusing the attention of many operating men upon the matter of rules for operation under signals. In many cases, apparently, this attention has failed to disclose the fact that the old rule permitting a train to "proceed, protected by flag" has been eliminated from the standard interurban code. As a consequence of this oversight several roads have adopted block-signal rules, which, at least by implication, concede the right of trains to proceed in this manner.

The process of proceeding, "protected by flag," applies, of course, only to cases where trains on single track roads are unable to get into communication with the dispatcher, and under such circumstances the trainman is placed upon the horns of a dilemma from which he must be rescued by definite advice in the book of rules. In the standard interurban code prior to 1911 the matter was covered by old rules 203 and 203a whereby a train could proceed under control within one-half the range of vision on straight track, the conductor walking ahead at all curves "at a sufficient distance to fully protect his train."

However, at the 1911 convention this rule was eliminated as not being good practice, the record appearing on pages 106, 107 and 217 of the *Proceedings* of that year of the Transportation & Traffic Association. In consequence, under the present rules for movement by train order, when a train is held for any abnormal condition and cannot get into communication with the dispatcher, it can proceed only on time-table rights, which may be acquired by running as a second section behind the next regular train in the same direction.

This procedure is outlined in rule 166 of the present standard code. Obviously it may involve a wait of two hours in case an opposing regular train fails to make a meeting point, because no regular train loses its rights until two hours late. Nevertheless, this possible delay has been considered to be less objectionable than the risk of trusting trainmen to keep a safe distance behind a walking man as called for when proceeding, "protected by flag."

That the presence of automatic block signals should make permissible the return to a procedure that has been declared to be bad practice is hardly a reasonable assumption, and it is to be hoped, if only for the sake of uniformity, that those electric railways which have embodied in their signal codes the flagging rule for opposing movements will remove it. But little is gained by its presence among block signal rules, because it is seldom indeed that any catastrophe can shut down the telephone and not also affect the signals, thus making necessary the operation of the road by timecard only.

In block-signalled territory there are, of course, two general conditions which invite the application of the flagging rule. One of these exists when a signal in stop position holds a train for a period in excess of that required to run through the block in advance. This naturally constitutes strong evidence that the signal is out of order, but that does not justify the train in blindly entering the block without word from the dispatcher, because it is possible for a high-speed opposing train to enter the block without warning at any time before the entry of the first-mentioned train has set the signal at the opposite end of the block. On the other hand, it is obvious that if the train waits in the clear until the arrival of a train in the opposite direction, or else until a trainman has gone to the nearest operative telephone, which in signalled territory will seldom be more than a mile away, the difficulty will be solved without the slightest risk being run.

The only other general reason for using the flagging rule would occur when the whole telephone line was down and a train was working its way over the road with the aid of the signals, the "range of vision," as cited in the old rule, being ample and the signals uniformly showing clear indications. With this phase of the question, however, there enters the matter of signal reliability, and too many incidental problems affect it to permit of its consideration at this time. However, it may be said that the belief of the block-signal committee seems to incline at present toward the use of single-track signals only as a safeguard superimposed upon the structure of operating rules, and for this reason the importance of this argument in favor of the old flagging rule is considerably reduced.

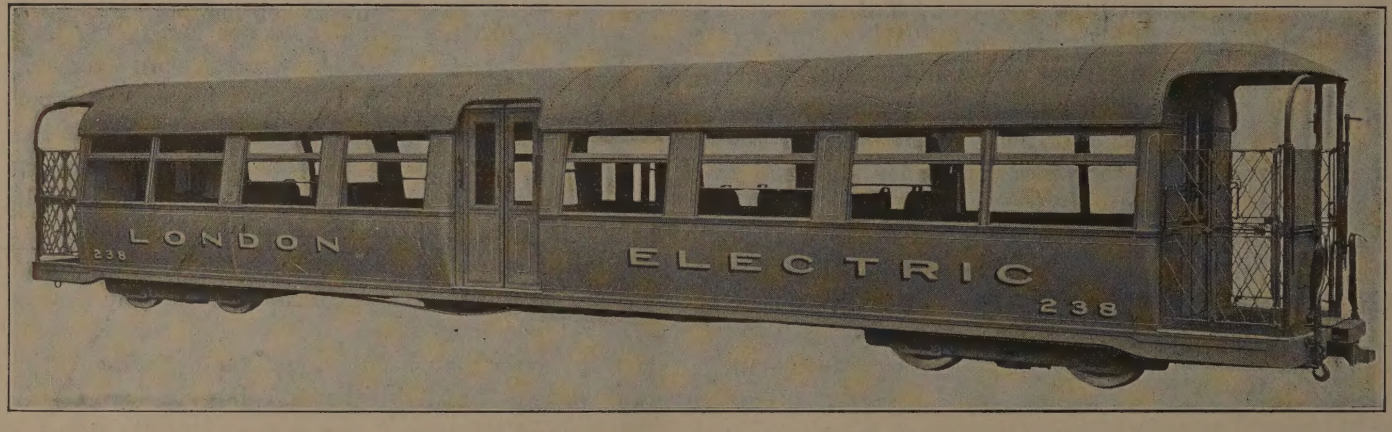
In any event the conditions cited are abnormal, and since normal operating conditions of the present time call for "safety first," the adoption of a block-signal rule that leaves a loophole for accident should be discountenanced by every operating man. The rules should state clearly and positively that a signal blade in stop position must not be passed except upon definite instructions from the dispatcher. This may involve complication in the case of intermediate signals when the telephone is out of order, but it will be safe operation and in accordance with good practice.

New Rapid Transit Cars for London

This Article Describes the Latest All-Steel Cars for the Metropolitan District Railway and the New Center-Entrance Cars for the Tube Service of the London Electric Railway

In the Electric Railway Journal for Feb. 7, 1914, some particulars were printed of recent improvements in rolling stock undertaken by the Metropolitan District Railway and the London Electric Railway, of which Sir Albert Stanley is managing director and W. A. Agnew mechanical engineer. That article stated that the latest District cars were built up of steel underframes, fireproofed wood and aluminum fittings; also that tests were being made with two tube cars which had been fitted with different types of center doors to provide more facilities for passenger interchange than the original single-platform design afforded. The tube motor cars really have two platforms, but the front end is not available for passengers owing to the installation of the contactor equipment above the floor line and behind the control cab.

Since the foregoing article was published the management ordered thirty all-steel cars for the Metropolitan District Railway and fourteen center-entrance cars for the Bakerloo tube extension to Paddington station. A description of each type follows:



LONDON UNDERGROUND CARS—COMPLETED CENTER-ENTRANCE STEEL CAR FOR TUBE LINES

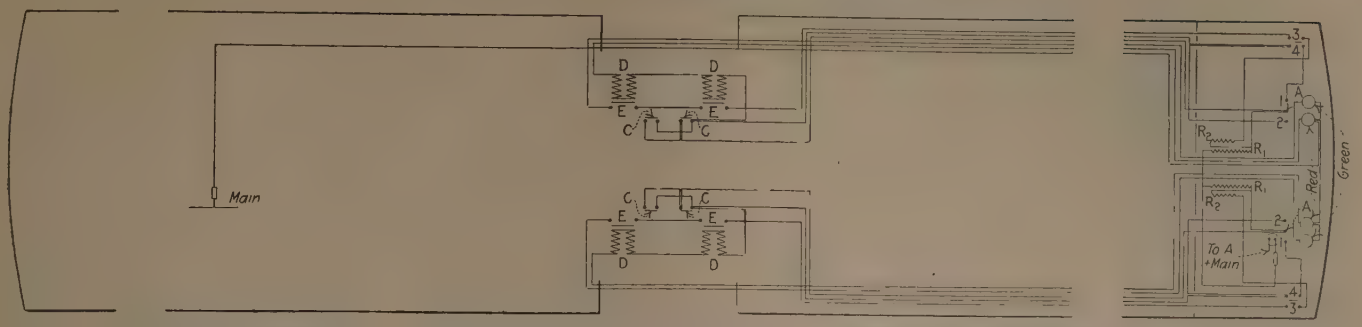
All-Steel Cars for Metropolitan District Railway

The new cars of the Metropolitan District Railway follow the same seating and door arrangement as the car illustrated on page 299 in the issue of Feb. 7, 1914, namely, in the use of sliding doors at each platform and in the center. The main dimensions, which are also substantially the same, are as follows: Length over all, 49 ft.; distance between the truck centers, 34 ft. 1 in.; width over the framing, 8 ft. 8 in., and height from rail to top of carlin, 11 ft. 11½ in. As shown in the accompanying half-tone and drawings, commercial steel sections are used for the framing throughout except that ash serves as a filler where indicated. The end sills are 8 in. x 3 in. x ⅜ in. channels, the sill at the motor end being of pressed steel. The cross-sills and center longitudinal sills are of 6-in. x 3-in. x ¼-in. I-section. Since the windows are more than 4 ft. wide it was not feasible to make the 1½-in. x 1½-in. x ¼-in. angle carlins integral with the side posts. Each post is built up of a pair of reversed angles with short struts between. The diagonal members between the bottom side sill and belt rail are angles 1½ in. x 1½ in. x ¾ in., while the diagonals which brace the 3-in. x 1¾-in x 3/16-in. pressed-steel corner posts are channels 2 in. x 1 in. x 3/16 in. The floor is of ¾-in. "Sanit" composition on 3/16-in. flat steel plate. The interior fittings of the car are of polished aluminum alloy, and the advertisement and other moldings of pressed steel. The aluminum fittings were furnished by the British Aluminium Company, London.

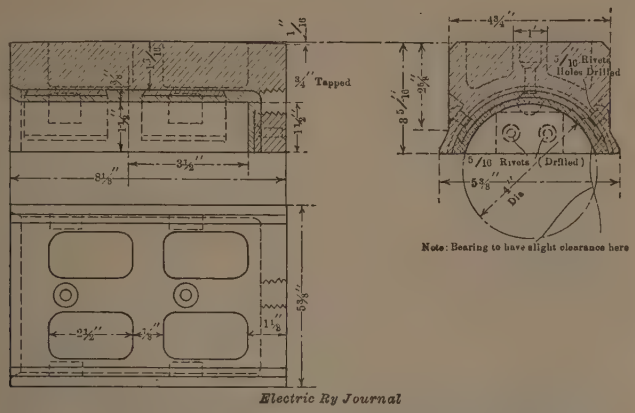
The interior lighting is also of modern type, consisting of obscured bowl fittings in the roof and bracket lights over the cross-seats. The sides, doors and roofs are of steel panels of the thicknesses shown on the drawings. The roof is covered with 16-oz. cotton duck.

The monitor roof has been abandoned in favor of the single-arch design principally to secure better workmanship in steel construction than would have been possible with a monitor roof. This change, however, has not decreased the total weight of the car, as the company preferred to increase the sizes of certain members over those of earlier cars. Ventilation is secured by the use of seven Acme ventilators, in addition to which small movable sashes are provided over the large windows. The entire floor area of 320 sq. ft. is available for passengers except that on the leading car a space of 3 ft. depth x 8 ft. width is reserved for the motorman. This means that on a standard District eight-car train of four motor-cars and four trailers 99 per cent of the total area is available for the accommodation of passengers. The vestibule side doors have a free opening of 2 ft., while the double doors at the center of the car have an opening of 3 ft. 5¾ in. between the glass partitions inside the car, but part of this space is required for the installation of mahogany hand rails. The seating is a combination of cross and longitudinal seats, the former accommodating sixteen and the latter thirty-two passengers. Folding seats are provided for both the conductor and the motorman. The width between the aisles of the 38-in. cross-seats is 19 3/8 in., and between the longitudinal aisles 46 in. The use of pressed steel for the seat legs is in accordance with the company's practice for several years past. The seats are covered with moquette velvet, which passengers prefer to rattan. This velvet is kept clean by brushing it with a special solution related to tetrachloride of carbon, and by vacuum cleaning.

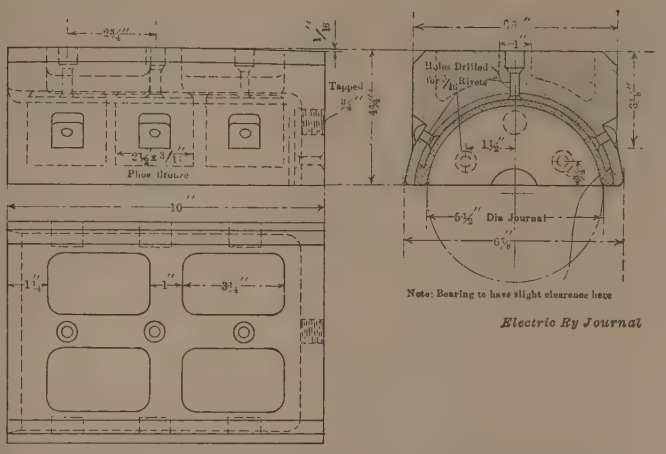
With regard to the trucks, the company had in its original stock motor trucks of the cast-steel Hedley type and trailer trucks of the equalizing type, but the severe service gave a good deal of trouble owing to fractures in various parts, and the riding did not prove all that



LONDON UNDERGROUND CARS—DIAGRAM OF ELECTRIC LOCK OPERATING MECHANISM FOR DOORS



LONDON UNDERGROUND CARS—JOURNAL BOX BEARINGS ON TRAILING AXLE

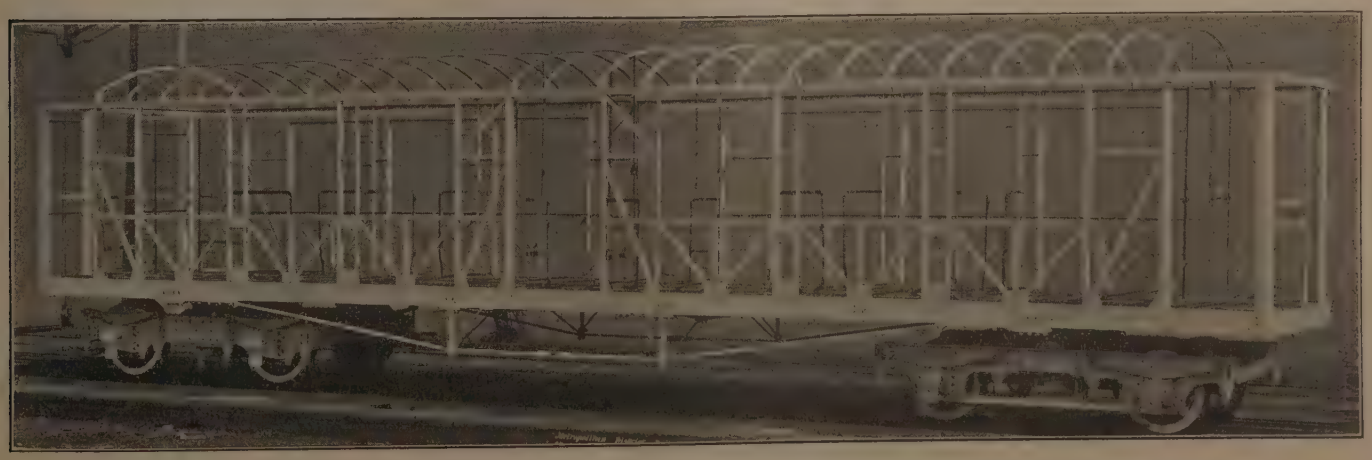


LONDON UNDERGROUND CARS—JOURNAL BOX BEARINGS ON DRIVING AXLE

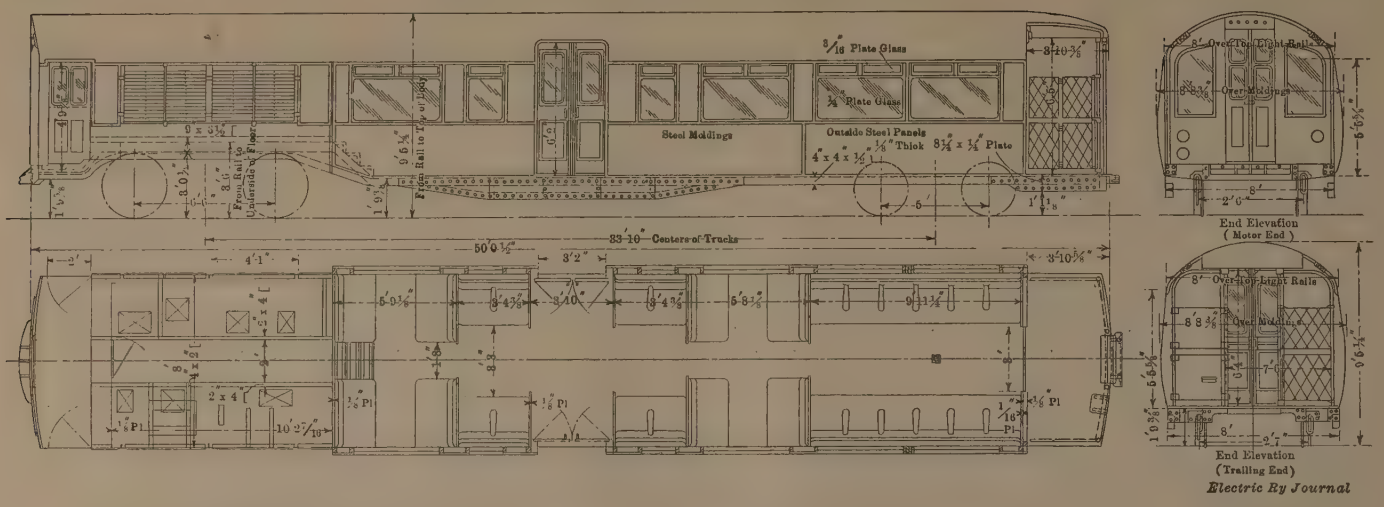
was desirable. The trucks now used have been tried out for four years and, beyond a few troubles which have been overcome, have shown themselves decidedly more economical to maintain and more comfortable in running than the old type. The weight of the new pressed-steel motor truck of 7-ft. 3-in. wheelbase is approximately 12,400 lb. complete with wheels and axles, as compared with the old 6-ft. 6-in. motor truck of 11,300 lb. The new pressed-steel trailer truck of 7-ft. wheelbase complete with wheels and axles weighs approximately 8000 lb., as compared with 7500 lb. for the old trailer trucks of 5-ft. wheelbase. The increase in wheelbase was made to get inside brakeshoes and to reduce the wear on the track.

The new motor truck has a width of 6 ft. 1 in. over end bars, a length of 11 ft. 4 in. over the end bars, and wheels of 36-in. diameter. The trailer truck has a width of 6¼ ft. over the end bars, a length of 11 ft. 2½ in. over end bars, and wheels of 30-in. diameter. Unlike American motor and trailer trucks the springs under the bolster are spiral instead of elliptical, while the springs at the journal boxes are elliptical instead of spiral. On both trucks an anti-vibration packing 1 in. thick is placed between the underside of the bottom spring seat and the top of the spring plank. The journal boxes are of cast steel. Both the motor and journal which are illustrated are combined with the thrust block. This block is of cast steel and is lined with white metal on phosphor bronze strips which serve to key the metal and also to prevent the swaying of the axle if the bearing metal should run out.

The motor truck carries two 230-hp GE-212 commutating-pole motors with a gear ratio of 3.37. The control is Type M. The air-brake equipment includes a CP-30 compressor on each motor car. The weight of each motor is 6100 lb., or 26.5 lb. per rated horse-power. The weight of the motor car complete is 76,160 lb., of the motor truck complete 24,640 lb., of the trailer truck complete 7840 lb., of the motor-car body complete and equipped 43,680 lb. The horse-power per ton (of 2000 lb.) of train is 7.36. The total floor area, as previously noted, is 320 sq. ft., and this figure corresponds to 11.5 sq. ft. per long ton for a motor and trailer car combined, 9.4 sq. ft. for the motor car only and 14.7 sq. ft.



LONDON UNDERGROUND CARS—STEEL FRAMING FOR MOTOR CARS OF METROPOLITAN DISTRICT LINE



LONDON UNDERGROUND CARS—ELEVATIONS AND PLAN OF CENTER-ENTRANCE STEEL CAR FOR TUBE SERVICE

for the trailer only. The weight per seated passenger is 1280 lb. for motor car and trailer car combined.

The District cars and trucks were built by the Gloucester Carriage & Wagon Company, Ltd., to the designs of the mechanical engineer of the railway company.

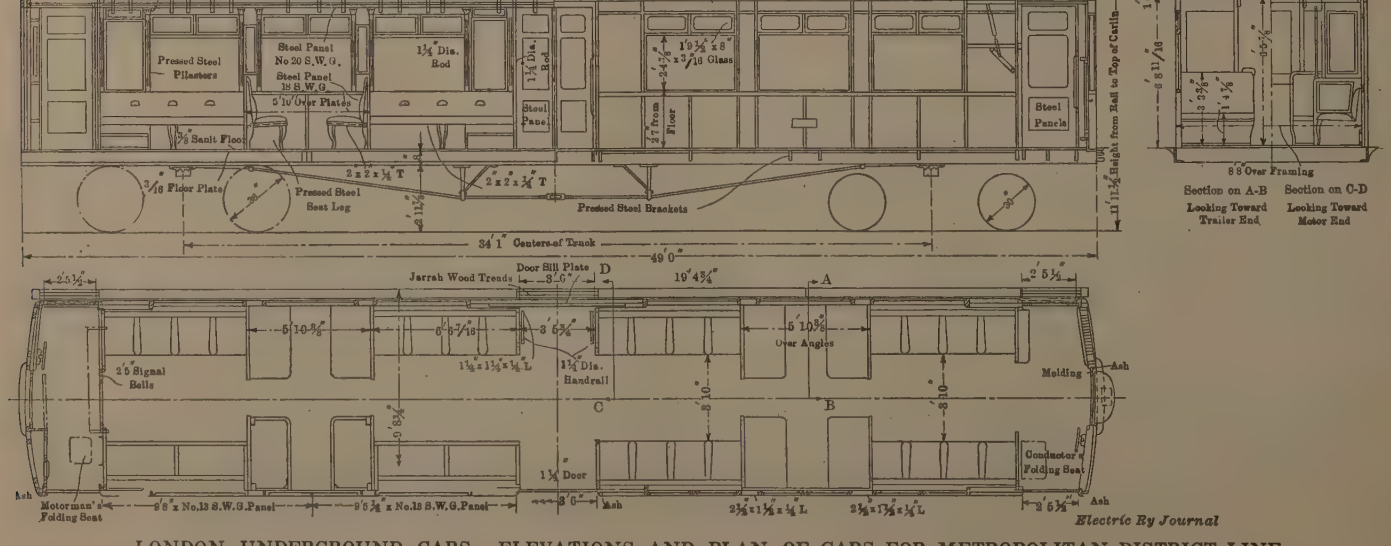
London Electric Railway Cars

The new motor cars of the London Electric Railway are also of steel construction. The framework is built up of commercial sections with the exception of the fish-belly side girders. The end sill at the trailer end is a 4-in. x 4-in. x ½-in. angle while that at the end sill at the motor end is a special steel pressing. The center longitudinal sills and cross-bars are 4-in. x 2-in. channels weighing 8 lb. per foot. The side posts are 2½-in. x 2 in. x 3/16 in. angles, and the carlins 1½-in. x 1½-in. x 3/16-in. angles. There are no diagonal braces in the side framing, the side plating being sufficient. At the center entrance the framing is reinforced by a fish-belly plate ¼ in. thick and 12 in. maximum depth with a second 4-in. x 4-in. angle. The panels are of ⅛-in. steel plate. Ventilators of an unusual cast-grid type to the number of six are set flush in the ceiling practically over the seats. These lead into an air duct which is open to the atmosphere at each end of the car, the ends being protected by hoods.

It will be observed from the accompanying plan and elevations, that the doors at the control end are for the use of the motorman only. A distance of approximately 11 ft. for the full width of the car is required for the control equipment because the limited clearance in the Bakerloo, Piccadilly and Hampstead tubes does not permit this apparatus to be placed under the car floor. In fact, the over-all height of the car above the rails is only 9 ft. 5¼ in. The control end of the car is mounted on a truck of 6-ft. 6-in. wheelbase supplied with wheels of 36-in. diameter. The trailer truck is of 5-ft. wheelbase and has wheels of 30-in. diameter. The trailer end of the platform is fitted with swinging gates.

The novel feature of this car is the center-door arrangement. The doorway itself is 6 ft. 2 in. high and is equipped with two passenger-operated doors which are pushed inward to give a clearance of 3 ft. 10 in. at the threshold. These hinged doors are self-closing and are supplied with electrically controlled locks. Small signal lamps are installed at the conductor's station to indicate when the doors are closed and locked. These are the first European cars in which light signals have been used for such a purpose.

The electric lock-operating mechanism consists of resistances *R*1 and *R*2, a double-throw switch *A* operated by hand, a double-throw switch *B* operated by the end gates of the car, door contact *C*, and latch-lifting magnets *D*, which also operate contact *E*. For normal operation the switch *A* is closed on contact No. 1. When the end gates and middle doors are closed switch *B* is on contact No. 3. Current then flows through *R*1, *R*2, *R*3, *E* to the green lamp, which indicates to the conductor that the middle doors are closed and locked.



LONDON UNDERGROUND CARS—ELEVATIONS AND PLAN OF CARS FOR METROPOLITAN DISTRICT LINE

When the gates are opened the switch *B* makes contact at *B*4, and the current flows through *B*1, *A*1, *B*4, coils *D* to the red lamp, unlocking the middle doors. If the middle doors are now opened, a circuit is closed through contacts *C*. If the conductor now closes the end gates the current flows through *A*, *C*, *D* to the red lamp, so that this remains alight, indicating that the middle doors are open. When the middle doors close contacts *C* are lifted, opening the circuit through the coils *D*, the latches fall and the circuit is closed again through *E*, lighting the green lamp. If it is desired to open the middle doors without opening the end gate, switch *A* is placed on contact No. 2. To open the end gate without unlocking the middle doors switch *A* is placed in the "off" position. The resistance of *R*1 is 1600 ohms. The resistance of *R*2 is equal to that of the lifting coils, which is 800 ohms.

Each motor car is fitted with two GE-212 motors and Type M control. The motor trucks are similar in construction to those used on the Metropolitan District Railway. The trailer trucks are of special design on account of the low car body, the floor of which is only 22 in. above the rail. The seating arrangement consists

LONDON UNDERGROUND CARS—INTERIOR OF NEW METROPOLITAN CARS, SHOWING IMPROVED LIGHTING

of sixteen cross-seats and twenty side-seats. As in the District cars, the side-seats are divided by barriers to form seats for individual passengers. The transverse seats are 38 in. wide, the aisles between the seats are 20 in. wide and between the longitudinal seats 39 in. wide. The cars were built by the Brush Electrical Engineering Company, Loughborough, to the designs of Mr. Agnew.

The floor spaces and weights of these cars are as follows:

Length over end sills	50 ft. 0½ in.	
Centers of trucks	33 ft. 10 in.	
Area of passenger compartment	256 sq. ft.	
Number of seats	36	
Weight of car body without equipment	29,500 lb.	
Weight of equipment in body	4,500 lb.	
Total weight of body and equipment		34,000 lb.
Weight of motor truck without equipment	12,200 lb.	
Weight of motor truck completely equipped		24,500 lb.
Weight of trailer truck complete		6,500 lb.
Total weight of car		65,000 lb.

The accompanying half-tone of the car marked "London Electric" is that of a trailer car, but it will serve to show the general form of the motor car described. The main difference in the outside appearance is that the control section is fitted with louvered openings instead of windows.

Separation of Freight and Passenger Operating Expenses Ordered

The Interstate Commerce Commission, on June 13, handed down a decision requiring railway companies in Class I, or those having annual revenues of $1,000,000 and over, to separate their operating expenses between freight and passenger service as outlined in statistical series circular No. 3. This circular will be revised, and if sufficient progress can be made the carriers will be asked to file a special report for the year ending June 30, 1915.

In its decision the commission reviews the history of this plan. Prior to 1894 such a separation was required, but it was discontinued because the railroads claimed that in only a few expenses was an accurate separation possible. The commission believes that during the past twenty years railway accounting and accounting generally have developed so that a reconsideration of the matter seems warranted. The commission then cites the railroads which are now following the plan. They include approximately half the mileage of the large carriers in the United States. The officials of these roads say that they have made this voluntary separation to secure efficiency and not for rate-making purposes, and that, when conducted on this basis, it is not so important that the arbitraries used are exactly correct or not. The commission states that it is not interested in statistics of this character merely for the purposes of rate making. The statistics would be valuable for making comparisons, and it is the duty of the commission to keep itself informed in regard to the manner in which the railway business is conducted and to have a knowledge of variations in unit costs.

It was urged that if the commission really needed this information a special study should be undertaken at any time for the individual case considered, but the commission thinks that while such special study would be necessary it cannot take the place of general statistics systematically compiled year after year. It was also suggested that the commission should wait until the courts had rendered decisions in certain pending rate cases before making this requirement, but the commission thinks it is justified in making the order because the courts have a right to look to the commission for careful study of railway statistics and accounts.

Another argument urged against the plan was the possible misuse of the information collected. It was urged that to give cost accounting information to the public would be the same as giving dangerous instruments to children. The commission believes, however, that a systematic development of the subject and its free discussion is the best safeguard against the misuse of cost figures. Commissions and legislators are not intentionally unfair, and if any of them have enforced unjust rates, statistics of the kind contemplated might have convinced them that some other schedule would have been more just.

Another argument against the adoption of the plan was its expense. On this point the commission says that the carriers were asked to submit estimates of this expense, and the estimates varied from $78.29 per mile for the Lackawanna to $3.17 per mile for the Southern Pacific. The commission believes that if expense alone were to be the determining factor, a new estimate will have to be made after its revised circular has been published.

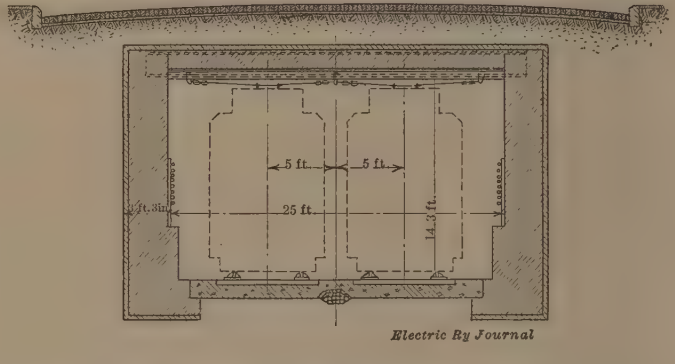
The commission concludes its report by saying that in the light of all the suggestions received a workable plan will be developed which it believes will not be unduly prejudicial to the carriers.

Subway Development at Buenos Ayres

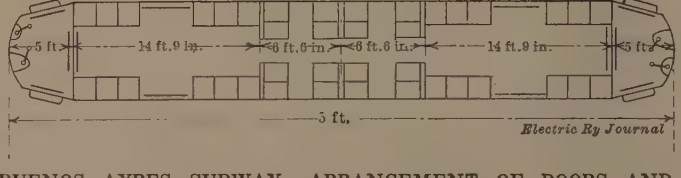
The System Is Remarkable for the Use of 1100-Volts Direct Current, and the Operation of the Same Cars for Subway and Street Operation

In a recent issue of the *Elektrotechnische Zeitschrift* E. E. Wachsmann presents some interesting particulars on the subway lines of Buenos Ayres. The population of Buenos Ayres, in 1913, was 1,457,885, and in the same year the number of passengers carried by the street railway system was 407,252,140, before real rapid transit was inaugurated. The system now in service covers 10 miles and is operated by the Compañia de Tranvias Anglo-Argentine, Ltd. The franchise was obtained Dec. 28, 1909, and construction was begun almost immediately.

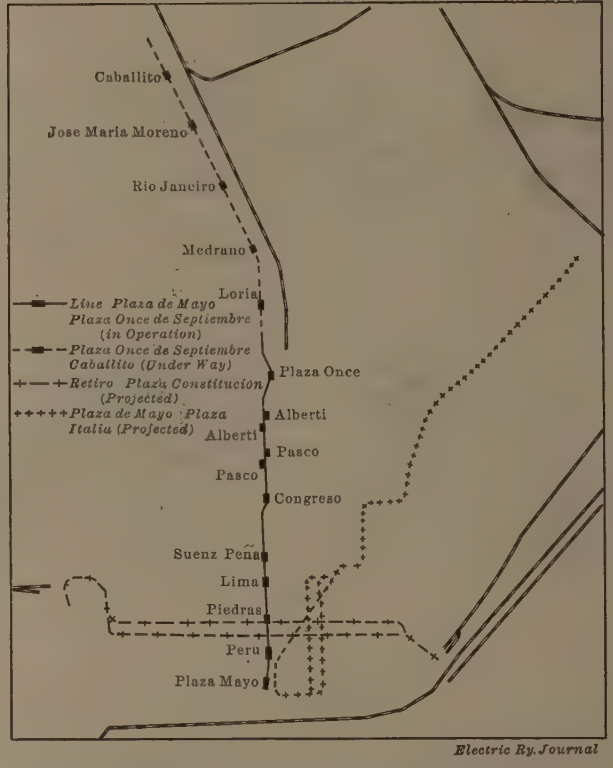
The franchise covers three routes as follows:



BUENOS AYRES SUBWAY—PLAN SHOWING PROFILE VIEW OF THE TUNNEL



BUENOS AYRES SUBWAY—ARRANGEMENT OF DOORS AND SEATS IN PASSENGER CARS



BUENOS AYRES SUBWAY—PLAN SHOWING ROUTE OF PRESENT LINE AND FUTURE ROUTES

Line 1.—Plaza Mayo through the Avenida de Mayo to the Plaza Congreso-Plaza Once, with a later extension to Plaza Primera-Junta (Caballito), 4.34 miles, known as the Mayo-Once-Caballito line.

Line 2.—At right angles to the former and running from Constitucione to Retiro, about 2.79 miles long.

Line 3.—Plaza Mayo in a northwesterly direction to Plaza Italia, about 4.03 miles long.

The present installation is double-track throughout, with nine stations, spaced about 1300 ft. apart. The average grade does not exceed 0.5 per cent. The greatest distance between the head of the rails and the surface of the street overhead is 26 ft. and the least is 16 ft. As the accompanying map shows, there are very few curves.

Construction of Tunnel

The clear height of the tunnel between the head of the rails and the roof is 14.3 ft. and the clear width 25 ft. No columns divide the tracks. The tunnel roof is usually built up of brick and steel, reinforced concrete being used only at the four-track section near Plaza Once station. Tar paper and asphalt are employed for weatherproofing. Ventilating shafts of 32 sq. ft. opening are installed about 525 ft. apart. Translucent roof coverings are also used wherever possible, so that the subway has many daylight sections. Work on the subway was begun in November, 1911, and ended twenty months afterward. The cost of construction was $7,087,500. The excavation amounted to 527,000 cu. yd. The masonry amounted to 77,500 cu. yd., using 31,000,000 brick and 108,000 bbl. of Portland cement, weighing 374 lb. each. Other quantities were 13,000 tons of columns and 96,840 sq. ft. of waterproofing.

Track, Line and Stations

The track consists of 87.5 lb. rails placed on wooden ties. The stations are generally 328 ft. in length, which is enough for six-car trains. They are entered from the sidewalk by two stairways, each having an archway with an illuminated destination sign. A different color scheme is used for each station. At the most important station, Plaza Once, there are six tracks, the four outer ones being used for the subway service and the two middle tracks for interchange of passengers with the Western Railway. Power is purchased from the central station of the Deutsch-Überseeischen Electricitäts-Gesellschaft via four substations. The distribution system includes 550 volts for the surface lines and 220 volts for lighting. In view of the forthcoming operation over surface railway extensions, current collection in the subway is by means of two 1100-volt

BUENOS AYRES SUBWAY—PLAZA CONGRESO, A NOTABLE CENTER OF BUENOS AYRES. EXCAVATION WORK APPEARS IN THE FOREGROUND

100 sq. mm. (about No. 0000) grooved wires per track. Pantograph collectors are used. Of course, overhead current collection meant the high headroom already referred to, but the greater clearances will conduce to a cooler subway. Furthermore, ground water is not a disturbing factor.

The selection of the signal system was of particular importance owing to the intention to operate trains on only 1½-minute headway. The installation is of the semi-automatic type, similar to that used on the Hamburg Rapid Transit System. The indications are visual and are displayed only in the direction of running. The signal attendant also has charge of the switches, which are electrically operated with current from storage batteries. It is proposed to use straight automatic signals on the sections of this line next to be constructed. Every station has a large illuminated clock which is operated electrically from the central office of the company.

Rolling Stock

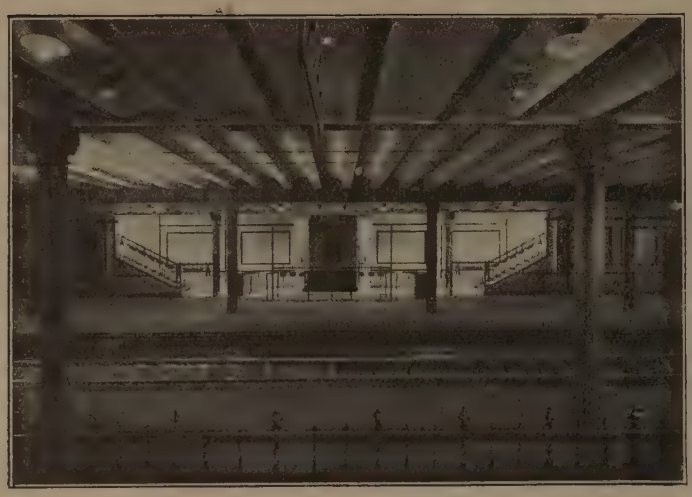
The cars are unusual in having end-drop platforms for street railway service and flush-floor side entrances for subway service. They are 52 ft. long, weigh 30 metric tons, and have twenty-four longitudinal and sixteen cross-seats upholstered in leather. The two doors on each side of the cars have a clear opening of 48 in. These doors are locked when the car operates on surface track; contrariwise, the doors on the end platforms are closed when the car is operated in the subway. Each car is equipped with two 115-hp. A.E.G. motors, operated at 560 r.p.m. The driving wheels have a diameter of 36 in. The rate of acceleration is 1.33 m.p.h.p.s. On the surface sections the control current is taken direct from the trolley, but on the tunnel sections it is secured at 500 volts from a motor-generator set. Air is provided for Knorr brakes, sanders and current collectors. Thus far fifty motor cars are in service. They are maintained at a shop with three bays, one for general machine work and two for 100 cars each. No trailers are used. The speed on the 1100-volt sections is 31 m.p.h.

BUENOS AYRES SUBWAY—PLAZA ONCE STATION, WHERE PASSENGERS ARE INTERCHANGED BETWEEN SUBWAY AND STEAM RAILROAD

BUENOS AYRES SUBWAY—AVENIDA DE MAYO, SHOWING SUBWAY ENTRANCE

Operation and Service

Until the line is extended to Cabalito, and previous to the electrification of the Western Railway's underground lines, the service between Plaza Mayo and Plaza Once will be with two to four-car trains at intervals of three to five minutes. When the line is extended to Caballito the trains will be broken up at Plaza Once into single cars for surface operation beyond that point. On return the cars will be coupled again into trains. The maximum length of the train is six cars.



BUENOS AYRES SUBWAY—SHOWING SIDE VIEW OF A TYPICAL STATION

This means that with a headway of 1½ minutes 16,800 persons can be carried in each direction per hour. The scheduled speed is 12.4 m.p.h., so that the trip between the present terminals can be made in 10 minutes and to Cabillito is 18 minutes. The average stopping time per station is 20 seconds. On the Mayo-Once section stations are about 1400 ft. apart, whereas on the outer or Once-Caballito section they are about 2600 ft. apart.

A unit fare of 10 centavos (Argentine silver) is charged for subway riding plus 5 centavos for a continuation of the ride on surface lines. The city receives 6 per cent of the gross earnings. The company's franchise is for eighty years. Tickets may be bought at the stations from automatic machines, which print the price, the date, the hour, the serial number and station. Service is given from 5 a. m. to 1 a. m. In 1913, 4,080,000 passengers were carried per mile of single track.

BUENOS AYRES SUBWAY—STANDARD MOTOR CAR WITH DOOR AND STEP SYSTEM FOR BOTH SUBWAY AND SURFACE OPERATION

Acknowledgment is due the Allegemeine Company for its courtesy in permitting the use of the halftones which illustrate this article.

The London, Brighton & South Coast Railway has sent about forty of its men, drawn from all ranks, on a visit to Germany to witness the latest electrical developments in that country and incidentally to inspect the Berlin works of the Allgemeine Company which is supplying a large part of the electrical equipment for the suburban lines of this railway.

A Labor Paper on Municipal Ownership

In its issue of July 18, the *Union Labor Advocate*, of Washington, D. C., the official organ of the Washington Building Trades Council, which is affiliated with the building trades department, American Federation of Labor, prints the result of an investigation which it has made of the municipal electric railways in the far western Canadian cities. Of municipal ownership of these railways it says in part:

"Municipal ownership, particularly of street railways, has been absolutely discredited in the house of its friends.

"Members of labor living in cities operating municipally owned street railways have come forward with testimony and evidence proving the abject failure of municipal ownership.

"The *Union Labor Advocate*" this week has received letters from the members of the three typographical unions in Edmonton, Lethbridge and Saskatoon, Canada, telling of the experience with municipally owned and operated street cars in those cities and showing varying degrees of failure in all.

" 'Although the news might be disappointing to you, I must give an unbiased, unpolitical opinion on such a question as municipal ownership—it is an utter failure in Edmonton,' writes J. Hanning, secretary of the Typographical Union of that city, 'on learning that municipal ownership of the street railways of the American capital is proposed and advocated by some union men.

" 'Our street cars have undoubtedly not been a success. I am no longer a believer in municipal ownership,' writes Secretary J. J. Jones, of Lethbridge.

"In Saskatoon, where the municipally owned street railway is only a year old, Secretary R. J. Moore still believes in municipal ownership, though he says that the railway has not been a success financially and tells of popular distrust in the management and dissatisfaction with the service."

The *Union Labor Advocate* then publishes the letters in question. That from Edmonton is printed complete below:

"Your letter dated June 26 has received my careful consideration, and although the news might be disappointing to you I must give an unbiased, unpolitical opinion on such a question as municipal ownership—it is an utter failure in Edmonton. The street car system is the poorest of five cities I have lived in —Toronto, Vancouver, Portland, Winnipeg and Edmonton—and the fares are equal to the highest—straight 5 cents.

"The reason for the failure of municipal ownership to compete or even compare with private ownership in this city is because the spoils system entirely eliminates all chances of getting competent men to run it. Every year the administration changes and with it the entire staff goes too. Always incompetent men are given the jobs, their ability lying in their power to get votes. We have the real estate alderman who makes it his business to use his influence to get a stub line built at the city's expense to a subdivision in the woods for the purpose of selling town lots and incidentally piling on the expenses of the corporation (city) by running empty cars to unpopulated districts.

"It is true they have lost $400,000 since its inception and it looks as though they will lose more. The city owns the electric light system and sells the street car service power at 2 cents per kw-hr., robbing Paul to pay Peter. Residents pay as much as 8 cents per kw-hr."

Electric Railway at Constantinople

Constantinople, the last stronghold of Turkey in Europe, now has an electric railway service, the present routes of which are shown in the accompanying map. The first section, which was opened in August, 1913, is in the Pera district. The service has proved enormously popular, 20,000 people a day being handled at the Pera station where passengers transfer from a cable line between Galata and Pera. The system is of meter gage and generally is double tracked. The lengths of the present routes total 18.6 miles of single track. Extensions which would bring the total length of the system to 31 miles of single track are now under consideration. One of the most beneficial accompaniments of the electrification has been the leveling and widening of many narrow streets.

The power plant at Siligthar contains three 6000-hp Brünner turbo-generators, which furnish three-phase current at 9600 volts and fifty cycles. The transmission system has three substations, namely, Bayazid, Galata and Taxim. Each substation contains a 400-kw 600-volt rotary converter. Both the high-tension and low-tension feeders are carried in underground cables. The overhead construction is of the ordinary side-pole type because the construction of the houses did not permit the use of rosettes despite the narrowness of the streets. The poles also carry arc lamps and two sets of telephone wires. On Pera Street, however, the telephone wires are carried underground. Every pole is topped by an ornament made up of a fez and Turkish crescent.

The present rolling stock consists of forty first-class motor cars, seventy second-class motor cars and fifty trailers. Another fifty motor cars are now on order. Each car seats eighteen passengers on reversible cross seats, the narrowness of the car permitting only a single-passenger seat on one side of the aisle. Not more than three standees are permitted inside the car, but seven are allowed on each platform. A feature

CONSTANTINOPLE ELECTRIC RAILWAY—INTERIOR OF CAR, SHOWING CURTAIN FOR HAREM SECTION

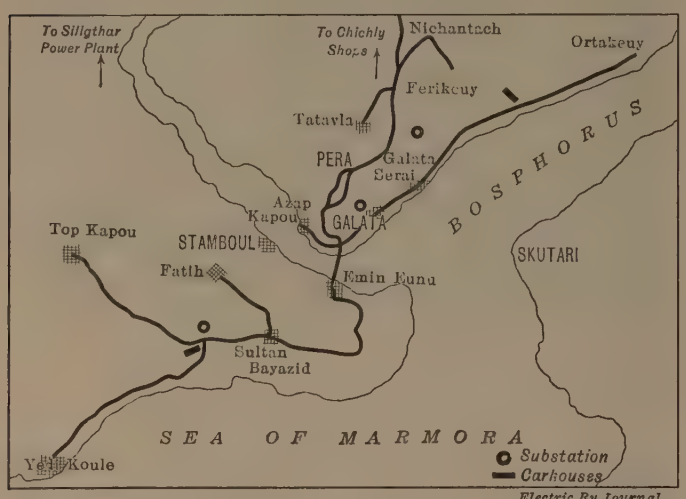
peculiar to Mohammedan practice is the use of a hanging curtain to screen off one part of the car to form a harem section. This curtain may be shifted according to the number of women in the car.

The trucks of these cars have a wheelbase of about 7 ft. to permit them to operate over curves of 49 ft. The equipment per car includes two Siemens-Schuckert D-58 commutating pole motors which are rated at 40 hp at 420 r.p.m. The maximum speed for motor cars on level track is 15.5 m.p.h. The controllers have nine running and six braking positions. Ordinary braking is done by hand, the electric brake being used only for emergencies. In addition a magnetic track brake is used on grades. Only the first-class cars have electric heaters. Of the three carhouses, that at Chichly is combined with the repair shops, stores and

CONSTANTINOPLE ELECTRIC RAILWAY—VIEW OF MOTOR CAR AND TRAILER

a residence for the operating officials. The contractors for the different parts of the line follow:

Power plant at Siligthar, Ganz & Company, Budapest; overhead line, Allgemeine Company; substations, French Thomson-Houston Company; car bodies, Maschinenfabrik Augsburg-Nürnberg A.G., Van der Zypen & Charlier and La Croyere Company; trucks, United Electric Car Company, Ltd.; forty motor car equipments and the bow collectors, Allgemeine Company; all other car electrical equipment, Siemens-Schuckert Company.



CONSTANTINOPLE ELECTRIC RAILWAY—MAP OF STREET RAILWAY SYSTEM

Maximum Length of Profitable Ride in Boston

In connection with a report upon transportation conditions within the Boston metropolitan district submitted to the last Legislature, the Massachusetts Public Service and Boston Transit Commissions, sitting as a joint board, filed an appendix discussing the maximum length of profitable ride on the Boston Elevated Railway system. The board recognizes that the determination of this question does not admit a general answer, being dependent upon certain assumptions, but it works out the case for Boston on the supposition that the average passenger rides two-thirds of the length of each half round trip. The appendix is abstracted below.

The capital of the Boston Elevated Railway (without the West End company) is $48,229,400; allowing 5 per cent as a fair rate of return on the stock and notes outstanding, and the actual bond interest paid, the total return on the capital is $2,496,784, or 5.18 per cent. If the capital included in the leased West End Street Railway is included, the total capital on which the company is responsible for a return is $86,383,550 (not including the Boston subways, whose rentals are deducted in the following tabulation, and a few small items). The total return upon this is $4,661,435, or an average of 5.40 per cent. The board states that in view of the fact that the capital of these companies has been issued under the approval of the former Railroad Commission and that the same board has in the past fixed the price at which Boston Elevated stock shall be issued at as high as $150 per share (par value $100) it cannot be urged with reason that this average rate of return is too high. If as small a sum as 1.6 per cent is allowed per annum for depreciation charges, the company should earn a total of 7 per cent on its capital; if the depreciation charge allowed is 2.6 per cent, the requisite return would be 8 per cent.

Study of Operating Data

Operating expenses, 1912-1913	$11,135,581.18
Taxes, 1912-1913	1,128,021.51
Interest on West End Street Railway funded debt	776,360.00
Interest on West End stock and other charges on leased property	1,468,819.15
Subway rentals	687,308.54
Total charges except return on Boston Elevated investment	$15,196,090.38
Total number of revenue passengers	326,352,863
Total number of passengers riding on each line, including revenue passengers and those who transfer from the line on which they pay fare to another line, either by check or free bodily transfer, estimating the transfer passengers as 0.6 of the revenue passengers	524,666,992
Total car miles run	57,504,571
Total number of half round trips	13,443,554
Average length of half round trip, in miles	4.28
If it is assumed (contrary to the facts) that every passenger rides the entire length of a half round trip, the total number of passenger miles becomes	2,245,574,726
As each passenger does not do this, it is assumed that two-thirds of each half round trip is the average length of ride, making the following estimated total passenger mileage	1,497,049,817

The actual cost per passenger mile then, excluding return on investment, depreciation and sinking fund charges, is

$$\frac{\$15,196,090}{1,497,049,817} = 1.01 \text{ cents}$$

If, then, the actual cost of carrying a passenger a mile, not allowing for return on investment, is 1.01 cents, it follows that if a passenger is carried $\frac{5}{1.01} = 4.95$ miles, his fare is entirely used for expenses, leaving no return on capital; in other words, a portion of each 5-cent fare must be reserved for return on capital, leaving only the remainder available for operating expenses and taxes.

Last year the capital of the Boston Elevated Railway received a total return of	$2,496,784
Other charges were	15,196,090
Total	$17,692,874

Every 5-cent fare was divided as follows:

$$\text{Return on capital } 5 \times \frac{2,496,784}{17,692,874} = 0.7 \text{ cent}$$

$$\text{Available for expenses and taxes } 5 \times \frac{15,196,090}{17,692,872} = 4.3 \text{ cents}$$

The maximum distance which the company could afford to carry a passenger for 5 cents, giving capital the return received last year is $\frac{4.03}{1.01} = 4.25$ miles.

If the total return on capital and for depreciation had been 7 per cent, the result would have been:

Return on capital and depreciation, 7 per cent on $48,229,400	$3,376,058
Expenses as above	15,196,090
Total	$18,572,148

In this case the proportion of the 5-cent fare available for expenses would be represented by the fraction $\frac{15,196,090}{18,572,148}$, giving as the return on capital, $5 \times \frac{3,376,058}{18,572,048} = 0.93$ cent.

$$\text{Available for expenses and taxes, } 5 \times \frac{15,196,090}{18,572,148} = 4.07 \text{ cents.}$$

Maximum length of profitable ride for 5 cents equals $\frac{4.07}{1.01} = 4.03$ miles.

In the same way, assuming that 8 per cent is a fair allowance for capital return and depreciation, we have:

Return on capital and depreciation, 8 per cent. on $48,229,400	$3,858,352
Expenses as above	15,196,090
Total	$19,054,442

$$\text{Return on capital, } 5 \times \frac{3,858,352}{19,054,442} = 1.01 \text{ cents.}$$

$$\text{Expenses and taxes, } 5 \times \frac{15,196,090}{19,054,442} = 3.99 \text{ cents.}$$

Maximum length of profitable ride for 5 cents, $\frac{3.99}{1.01} = 3.95$ miles.

The commission considers these results very illuminating and points out that the only assumptions involved are the estimate of transfer passengers and that every passenger rides two-thirds of a half round trip. If less than six-tenths of the passengers transfer, the actual cost per passenger mile becomes greater than computed, from which it follows that the profitable ride would be less than 4.25 miles on the basis of the present return on capital. If every passenger also rides less than two-thirds of a half round trip, the profitable haul is also found to be less than 4.25 miles. The expense of

operation is nearly constant, whether the passenger rides the entire length of a half round trip or only a fraction of that length, for wages and all other expenses except for the additional power necessary. The commission considers the estimate of 4.25 miles as the maximum profitable haul at Boston under present conditions "to be as close an approximation to the truth as can be deduced from the available statistics."

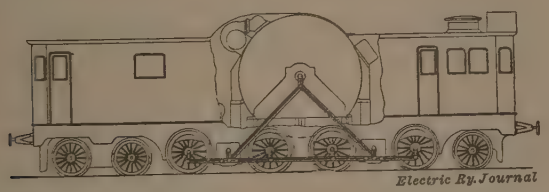
Drive and Equipment of Electric Locomotives*

BY F. LYDALL

Since the author's paper on "Driving Systems of Electric Locomotives" was completed, a few new designs have been developed and more experience has been gained. Two new designs are illustrated, being those brought out by the Bergmann Company for the Silesian Railways.

Type 2-D-1 of the Bergmann Company is shown in the first illustration, the special feature being the provision of two jack shafts coupled by inclined connecting rods to the armature shaft of the single motor. The obvious advantage of this design is that the torque produced by the one powerful motor is divided between two jack shafts. The locomotive is at present in course of construction.

Type 2-B + B-1 of the Bergmann Company is shown in the third illustration. The rating of the two motors on this articulated locomotive is the same as that of the single motor in the one just described. The mechanical arrangement is, however, entirely different, the jack shaft in each half being geared to the corresponding motor shaft. The Siemens-Schuckert Company is also building for the Silesian Railways a locomotive with gear-wheel drive on jack shafts.



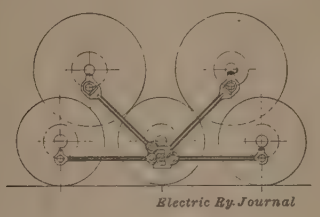
LOCOMOTIVE WITH TWO JACK SHAFTS COUPLED TO ONE MOTOR

Before leaving the subject of new designs, mention must be made of the so-called "two-rod drive" developed by Brown, Boveri & Company. Two locomotives of the general type 1-C-1 have been ordered from this firm by the Baden State Railway Administration for service on the Wiesental line. The special feature of this design, also illustrated, is that the two motors, which are mounted near the center of the body and well above the centers of the driving axles, drive direct on to the central driving axle without the intermediary of any jack shaft. The arrangement follows the lines of the Scotch yoke system in that the bearing on the crank-pin of the driving axle is free to move up or down in a vertical slot in the connecting rod which connects this crank with the corresponding crank of one of the motors. It differs, however, from the Scotch yoke in that the two connecting rods from the cranks of the two motors are pivoted together at the bottom angle instead of being rigidly connected so as to form a frame. This design is used to eliminate the heavy and expensive jack shafts with their cranks and bearings, etc., and to provide an arrangement in which great accuracy of adjustment of motor axle and jack-shaft positions is necessary.

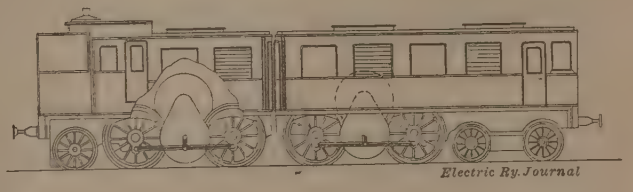
*Abstract of a paper printed in the *Journal* of the Institution of Electrical Engineers, London, and supplementary to Mr. Lydall's previous paper on "Driving Systems of Electric Locomotives," as abstracted in the ELECTRIC RAILWAY JOURNAL for Dec. 27, 1913.

LOCOMOTIVE EXPERIENCES

Attention has been drawn in the technical press to the difficulties experienced on the Wiesental Railway with the locomotives supplied by the Siemens-Schuckert Company. These locomotives are of the 1-C-1 type with two single-phase motors driving down by connecting rods on to a single jack shaft between two of the three coupled driving axles. Nine of these locomotives were delivered during 1913, and during the first month of working a number of mishaps occurred, some trifling and others more serious. The occurrences of minor importance were due to difficulties with the four-part motor bearings, the sand pipes and other small details. These matters were put right without any serious disturbance or any substantial modifications of the general design. The more serious mishaps were apparently due to some fundamental cause. It was found that at a certain speed the connecting rods and coupling rods on both sides of any of these locomotives started to vibrate and that this vibration gradually increased as the speed rose until, at a speed of about 22.3 m.p.h., it reached a maximum of considerable amplitude. This speed seemed to be the equivalent of resonance, as the vibration practically disappeared as soon as the speed had risen to 24.8 m.p.h.



TWO-ROD DRIVE



LOCOMOTIVE WITH EACH JACK SHAFT GEARED TO ONE MOTOR

This peculiarity of coupling-rod systems is observable on practically all locomotives in which the effort of the motor or motors is transmitted to the driving axles by means of connecting rods, especially where a pair of motors are coupled to a single jack shaft or are rigidly coupled together by any arrangement of connecting rods. It is not confined to the construction adopted for the Wiesental locomotives but is also observable with Scotch yokes, as on the 1-E-1 locomotive for the Lötschberg Railway, on which breakages of the yokes have taken place.

Having determined the fundamental cause of breakage, the Siemens-Schuckert Company devised a new arrangement—particulars of which the author is not at liberty to publish—which, so far as can be seen after several months' working, eliminates the trouble. The new arrangement does not require any far-reaching alteration to the general design, the jack shaft being used as before with the two connecting rods and the coupling rods on each side.

At present there is a tendency on the Continent toward the use of gearing rather than connecting rods for transmitting the torque to the jack shaft or direct to the driving axles. If the author is not mistaken,

this is also the general conclusion in the United States, where the connecting-rod drive does not find much favor. For express passenger service, however, there still remains the difficulty of excessive gear velocity if gear drive is employed. For speeds which would be required in England, say, 75 m.p.h., it would hardly be practicable to run without some kind of forced lubrication for the gears, as, for example, by jets of oil directed against the surfaces of the gears in contact.

MOTOR AND CONTROL EQUIPMENTS

Motors for locomotives may be divided into two classes, namely, geared and gearless motors. The geared motor seems practically confined to locomotives of moderate speed, as, for instance, locomotives whose maximum speed never exceeds 60 m.p.h. to 65 m.p.h.; whereas for express passenger locomotives, with which speeds up to 80 m.p.h. or 85 m.p.h. may be reached, the gearless motor practically holds the field.

For d.c.-motors of moderate capacity there seems no difficulty in raising the supply voltage to 2400, as in the case of the locomotives for the Butte, Anaconda & Pacific Railroad. A step in advance of this is being tested on the Lancashire & Yorkshire Railway, where motor-car equipments are being supplied by Dick, Kerr & Company, each consisting of four 250-hp 1650-volt single-reduction single-geared motors with driving wheels of 44-in. diameter, the supply voltage being 3300. These equipments are said to work with perfect satisfaction, but it is evident that in some places inside the motor the clearances between live parts and the frame must be comparatively small. The electrical designer would feel happier in making the motor with ample internal clearances, and this could only be done by freeing the motor, by one or other of the various methods available, from the restrictions of the gage and the wheel diameter.

In considering the two a.c. systems the question of frequency is important. For three-phase locomotive motors, especially those operating in cascade, a low frequency is desirable. So far as capacity in relation to weight and bulk is concerned, polyphase induction motors make a very good showing. It must be remembered, however, in comparing induction motors with motors having series characteristics, whether direct current or single-phase alternating current, that the induction motor is rated at its maximum speed, that is to say, at a speed which may correspond to permissible maximum peripheral velocity of the rotor, whereas the series motor is rated on the basis of a speed which may be, and often is, not more than half the maximum. If series motors were especially designed to give their output on the one-hour rating at their maximum speeds they would compare very favorably with induction motors. In practice, the single-phase motor, even at the low frequency adopted as the standard on the Continent (sixteen and two-thirds or fifteen cycles) is undoubtedly more bulky than the d.c. motor.

In the course of the ensuing discussion J. B. Sparks, consulting engineer, London, said that the heavy currents in single-phase motors probably constituted one reason why single-phase locomotives are so much more expensive than d.c. locomotives. The cost of d.c. locomotives is already only $300 or $350 per ton. For example, the average cost of the forty-seven locomotives of the New York Central Railroad works out at just over $35,000, which is a little more than $300 per ton. Very few figures have been published for single-phase locomotives, but the cost is approximately double that of d.c. locomotives. For example, the 800-hp, 53-ton locomotives for the Mittenwald Railway cost nearly $30,000, or $560 per ton.

Preliminaries to the Financing of Electric Railway Projects

BY H. J. DOUDS, IN CHARGE OF DEVELOPMENT DEPARTMENT, J. G. WHITE COMPANIES, NEW YORK

We have presented to us every day from twelve to eighteen projects for the organization of new companies, the development of new properties, and the purchase, sale or extension of existing ones. About 20 per cent of these proposals concern electric railways. About 90 per cent of these projects are submitted to us in very incomplete form. Some suggestions as to the way in which they should be prepared in order to receive attention by bankers should be of interest to readers of the ELECTRIC RAILWAY JOURNAL.

Take a typical case of an electric railway that it is proposed to build between two towns. The first things we want to know are the names of these two places and where they are located. Too often the answer will be that they are so many miles apart, but that their names and situations cannot be disclosed. In such a case naturally there can be no further negotiations, for financiering cannot be initiated on pure hypothesis. But if the names of the towns are given, the information, of course, includes the States in which they are located. This enables us to tell at once the "local color" as to the acts or attitude of the legislature or of the public service commission of the State regarding such public utilities, which may have an important bearing on the proposed investment.

The population of the two places and of the towns and townships in between, as shown by the latest United States census, should be given. We use these figures as a basis, making a proportionate allowance for the number of years that has elapsed since the last census was taken. To determine whether there have been any unusual factors influencing the growth of the population we check these federal statistics with the latest school census, post-office receipts, city and telephone directories. If no survey has been made of the contemplated route, the proposer should furnish approximate distance figures of the route mileage between the two towns.

Next is the question of the community of interests between the two places and the others that will be reached by the new road. Are the people interested in each other's welfare? Is the largest town the trading center of the surrounding country? What is the character of the population? What percentage of them own their homes? Are they thrifty, as shown by savings banks deposits? What industries are there in the region, and what is their history as to continuity of operation, labor troubles, etc.? From such information earnings of the new road are estimated, checked by further calculations as to probable car-mile and per-mile-of-road earnings. The latter are also checked with the gross earnings of analagous enterprises that have been in operation under similar conditions in other parts of the country.

Some of these data should be furnished by the proposer, when placing the matter before the financier. All will be checked by the engineer making the first investigation or reconnoissance survey, which will follow if the proposition seems sufficiently promising. This survey is invariably made at the expense of the proposer. If the project is accepted, the final surveys and all other engineering expenses are defrayed out of the construction funds.

Let me digress for a moment to say that when an owner presents himself or his case to a live, up-to-date concern, his statements are accepted as absolute facts. He is not asked to corroborate anything at the first in-

terview or in the first instance. Everything that he says is considered true until it is proved otherwise. If the project seems attractive, he may be asked to show proof of his statements. If it is not interesting —and the proposer is primarily an optimist who puts his best goods in the show window—it is no use discussing whether he is telling the truth or not.

From the data originally supplied and subsequently verified, and from the additional data gathered by the investigating engineer, the estimated cost of the road is arrived at—complete with all its right-of-way, grading, track, overhead, terminals, power houses, rolling stock, signal system, telephone lines, waiting stations, fencing, cattle guards, and all the little items that mean large amounts. In this the item of carrying charges during construction—the "dead" interest on the investment—should not be overlooked.

With all these items added together you have the total cost of the railroad. Assuming that the underwriting will be taken on a basis of 80 per cent for the bonds, the result is a bond issue of one-fourth more than the cash cost. From the rate of interest they bear the total fixed charges may be calculated instantly. How much will be available to pay these interest charges is arrived at by deducting from the gross earnings the operating expenses, taxes and depreciation.

Now we come to a point which no two bankers look at in exactly the same way. One banker will not touch a construction proposition if it does not show net earning of two and one-half times the interest charge. Another will be satisfied with less. These net earnings are applicable to the payment of interest and retirement of bonds through a sinking fund and to the payment of dividends on the preferred and common stock, in the order named.

If the road is being promoted by the "boosters" in the towns, the local interests will care only for the benefit that the community will derive from the line. These expect to reap their profits from the new road by the enhancement of real estate values, by increased sales of merchandise and by general trading. Their returns come quickly, and it is not of vital consequence to them how long it is until the road gets on a sound financial footing. The banker, however, has no other interests in that vicinity than the return from his bonds and the possible dividends on his stock.

Therefore the problem is to keep the interest charges down by making the bond issue low. A certain amount of money must be provided, outside of donations, subsidies, etc., and the financier or the owner must raise the additional sum. This money must be derived from the sale of securities that rank lower than the first mortgage bonds—preferred or even common stock.

Thus far we have dealt with the financing of a projected electric railroad. In the case of an existing property—a going concern—being offered for sale similar information should be supplied by the owner. The names of the towns through which it passes, the full corporate name of the road, a history of its ownership from the beginning (to show if it has been in financial difficulties, had strike troubles, or has been afflicted with any other ills) should be given. The financier must also know the exact route of the line. This, of course, should include a profile showing grades, together with a full statement of the line's general physical condition. Furthermore, the conditions under which the franchises have been granted and the length of their unexpired terms must be clearly set forth. The political complexion of the towns and of the regions roundabout them also are of much importance. The owner also should furnish annual reports, in detail, and balance sheets for several years back. The financier also desires to know where the outstanding securities are held, and if they can be taken up and retired by exchange or otherwise.

Not only present conditions, but also the future possibilities of the property are important. What profitable extensions could be made? How much would they cost and how much would they earn? Are there any other utilities in the towns that might be operated from the same power station, thereby reducing the cost of individual operation? The answers to these and to other questions that will occur to the experienced railway man are essential.

Finally the purchase price of the property comes up for discussion. This is technically known as the "basis" on which the property is to be bought. By this is meant that if a man wishes to sell a property for $1,000,000, including all bonds and stocks, free of all indebtedness, and that if the property shows earnings from operation, before the bond interest is deducted, of $100,000, the investment will return 10 per cent. The property would then be bought on a 10 per cent basis. If it earns only $70,000, it would be on a 7 per cent basis, and so on.

This "basis of purchase" is one of the fundamentals that is asked for by every financier, but the average man who brings a property up for sale seldom knows what it means. The basis of purchase varies. One banker may want a greater return than another. It depends on many things. A banker may buy a property on a 5 per cent basis because he has other interests that will fit in, and he may turn around and issue 5 per cent bonds against the property, making no profit on that particular investment, but deriving his gain from the enhancement of his other properties that will be benefited by it. On the other hand, some properties might not be considered even on a 10 per cent or 12 per cent basis because of their location or for a score of other reasons.

What class of electric railway projects are bankers most interested in at present, city or interurban? They are most interested in going concerns in the larger cities and centers of population. Under conditions as they are at present they do not care much for projected interurban roads. This is because the best earning locations are already occupied. Many small cities of from 5000 to 15,000 population are coming into the market and asking for financial help in building roads. Usually towns of this size are not regarded as favorable fields for financing. The average earning power of an electric road in such communities is too small.

It is hardly possible, in my opinion, to say what parts of the country bankers and investors look upon with the greatest favor, so far as electric railways are concerned. It depends entirely on the size of the city—the larger the better, for the earnings of electric railroads depend almost altogether on passenger traffic.

It has been generally considered that from 800 to 1000 population per mile of track exclusive of the principal terminal city should be the minimum for an electric interurban railway. That means the population in a strip 3 miles in width on each side of the track, or 6 miles in total width. There are many individual cases, however, where the character of the population or industries is such as to make interurban railways good investments yielding satisfactory earnings from a lower population per mile. With a city railroad the distances of travel must be sufficient to induce patronage of the cars, and this fact explains the general lack of success of lines in small towns.

What would be considered the minimum earnings per mile of track to be attractive? About $5,000. To explain: If a road earns $5,000 per mile and its operat-

ing expenses are 60 per cent of its gross income, the net earnings from operation would be $2,000 per mile. If the road costs $25,000 per mile in bonds to construct (a very low figure), its interest charges, at 5 per cent, would be $1,250 per mile. Deduct this from the $2,000, and there will be $750 a mile left to take care of the sinking fund, operating contingencies, shrinkage in business due to various causes, and so on. Five thousand dollars a mile would be about the minimum that would be attractive to a financier.

What percentage does the banker require for underwriting? That cannot be answered because each project stands on its own merits. If a project is to be built solely from funds accruing from the sale of first mortgage bonds, which the banker has to handle, he would naturally expect to have a sufficient margin in the price at which he takes the bonds to cover his selling expenses and profit. This may vary from 8 per cent to 15 per cent. He would also naturally expect to control the stock—to have more than 51 per cent of it, for, if he put in all the money, he would want control of his property. But if there were a large equity, making the bonds a safer investment—due, for instance, to local interests taking junior securities, then the price at which the banker would take the bonds might be higher and his proportion of the stock might be decreased.

Lastly, what percentage of the projects submitted are rejected for one reason or another, and how many are finally financed? Not to exceed 1 per cent of the projects submitted are financed by anybody, principally for the reason that 99 per cent of them do not show sufficient earning capacity. That is practically the sole reason. Other things can be overcome, but not that. It is the touchstone of every proposition in every field.

Inefficiency and Extravagance in Municipal Operation

Logan G. McPherson, chief of the Bureau of Railway Economics in Washington, has been delivering a series of lectures on modern railway problems at Johns Hopkins University. One of his recent lectures related to objections to government ownership of railways, and a number of new points were brought out in connection with this subject. The lecture applied particularly to interstate carriers and federal ownership and operation, but a great deal of what Mr. McPherson said applies with equal or even greater directness to the municipal ownership and operation of electric railways. The following are some of the points mentioned by Mr. McPherson:

"A prime distinction between political activities and economic activities is that the former are not engaged in the production of wealth, while the latter are. The underlying effort of all industry and commerce is to make 'two blades of grass grow where but one grew before,' or at least to see that 'a new dollar is returned for the dollar that is expended.' Political government has been under no necessity of making its activity immediately productive. To it, making both ends meet means no more than the levying of taxes sufficient to meet the expenditures. The people of the United States have many reasons to be proud of their government, but the manner in which public money has been expended is not among them.

"The folly that has characterized many Congressional appropriations for the improvement of waterways, to enable them to carry traffic that never by any possibility will come to them; for the erection of public buildings for the purpose of enhancing the value of real estate in a struggling town, and the ease with which millions after millions have been added to the pension roll, causing its aggregate to increase after the time when in the nature of things it ought to decrease, is known to all men.

"Such appropriations entail expenditure in utter disregard of sources of income. All sorts of committees initiate all sorts of expenditures, and the wherewithal comes from taxation. States and municipalities add recklessly to the burdens of taxation, and yet the administration of most of our large cities is so far inferior to that of cities of corresponding size in Europe as to make their condition a by-word.

"As the franchise in this country is held by virtually all male adult citizens, it is natural that great bodies of voters should seek to obtain, through governmental action, benefits which they have been unable otherwise to secure for themselves.

"Manufacturers have sought advantages through protective tariffs; railroad promoters have sought vast grants of land. It is not many years since it was common belief that legislation was controlled by the men in charge of the large business interests, and oftentimes by unworthy methods. Admitting that there was a large measure of foundation for this belief, it is a sad commentary upon the quality and the integrity of the men elevated to public office by the votes of their constituents.

"Now the tables are turned. It is the organizations of great bodies of voters, such as the trades unions, who have lobbies at the federal and State capitals; who negotiate with a candidate before his election as to what he will do in return for their vote; who send telegrams of congratulations to governors when they approve bills instigated by the labor organizations.

Would Conditions Be Better Under Government Direction?

"Would the problem be solved, would the condition of the country be advanced, if the control of industry and commerce were placed directly under the auspices of the office-holders elected by the political democracy, instead of under the executives chosen by the industrial democracy? The army and navy are large organizations administered by the government, but they are not concerned with obtaining return for the money expended. The condition of the army at the beginning of the Spanish war did not afford a high testimonial to the efficiency of its administration, and it has often been claimed that there is a log-rolling in connection with the navy yards, as well as in appropriations for government buildings.

"As has time and again been pointed out, when a large organization is under the control and administration of a governmental body, that administration is affected in many ways by political influence. A public regulatory body, especially an appointed commission of the type now exemplified by the Interstate Commerce Commission and by the railroad and public-service commissions of the many States, is far less responsive to political influence than is a legislative body whose members are elected for short terms and who persistently seek re-election. Such a body may be an efficient critic and censor of the conduct of a business organization, although its own organization be defective and poorly administered. With proper authority it can bring pressure to bear upon those actually charged with the administration of business organizations that will cause them to remedy abuses such as a political organization would have great difficulty in remedying within its own ranks.

"If the railroads were taken over by the government it would be inevitable that no end of questions would come into politics that are not now subject to political decision.

"It is almost inevitable that the tremendous voting power of the railway employees would cause their votes to be sought by politicians with various promises of increases in pay and easier working conditions. The party in power, by having control of the railways, would have control of the nation. Should there come to the Presidency a man with the ambition to establish a dictatorship, his pathway would be the less difficult.

PERSONNEL LARGELY THE SAME

"It is impossible that under governmental ownership the railways would be manned in any appreciable degree by other than the employees now in their service. There probably would be more or less change in the officers charged with administration and management, but there could not be a great deal of change even in these, because men capable of filling such positions are now all too few. The great body of underofficials and employees would, of necessity, be constituted almost entirely of the same men of whom it is now constituted. Responsibility for their performance would rest ultimately with government officials elected by the people, instead of with officers owing their positions to their efficiency and retaining their positions only so long as their efficiency continues.

"The experience of the country with appropriations for river and harbor improvements and for public buildings gives ample reason for belief that if the building of new railroads were to become a matter of Congressional appropriations, Congressmen would endeavor to get railroads for their districts, and there would ensue interminable log-rolling and wasteful appropriations. It is almost inevitable that the shippers of a particular section of the country would cast their influence for the candidate who would endeavor to obtain rates that might give them an advantage in competitive markets. The result would be that the freight-rate structure of the United States, that has been undergoing a gradual adjustment to the needs of commerce, would be thrown into confusion.

DEFECTIVE PUBLIC ACCOUNTING

"That which the people through this regulatory body have been able to do in bringing to the clear light the receipts and expenditures of the railways, they have never been able to bring about for the receipts and expenditures of the political governments through the officers they have elected to administer those governments. The nearest approach that the government now makes to conducting a business enterprise is in the distribution of the mails, and the Post-office Department has never even been self-sustaining. A recent Postmaster-General reported that the deficit in the operation of the Post-office Department has been turned into a surplus, but that report was arrived at through distorted accounting, as reprehensible as any ever undertaken by financial buccaneers in railroad exploitation.

"In so rich a country as the United States the burden of taxation has not fallen heavily upon the people, although it has been asserted that if the aggregate taxation, direct and indirect, of the federal government, the State governments, the municipalities, and other political entities having the taxing power were assigned per capita, the proportion would be found to be greater than in any of the heavily-taxed countries of Europe.

"If the government were to take over and operate the railroads with the same degree of business inefficiency and business laxity that has characterized other phases of its administration, it would not be many years before taxation would bear severely upon every taxpayer.

"If the government were to take over and operate the railroads, the express service, the telegraph and telephone service, it would be the largest purchaser of coal, of iron, and steel, likely of lumber, and other of the great commodities of commerce, and its payroll would be increased by over two million employees. With their families this would mean that over ten million persons, or one out of every ten in the United States, would be directly dependent upon governmental disbursement.

"The entire country is in a ferment of economic education. The theory of our government is that its institutions rest upon the will of the people, and that they shall be determined only after thorough popular discussion and deliberation. It is to be hoped that the present discussion will not be cut off by a precipitate decision on the question at issue, but will continue until there is thorough understanding of the economic transition which has been taking place during the last half century."

A Warning for the Operator of a Power Plant

The zest of operating engineers to save time on repair work is sometimes too keen for their welfare. A recent discussion of the dangers of attempting to repair boilers, tanks and piping while such apparatus is under pressure which appeared in an accident insurance company's bulletin contains a valuable hint in the interests of safety. The man who undertakes work of this kind probably realizes that some danger inheres, but the disposition to overlook the risk of accident and to take chances should be frowned upon by all executives. Strict orders prohibiting the practice should be issued, and severe penalties should follow their violation.

A calking tool should never be used to stop a leak under pressure, nor should pipes, unions or couplings be turned up, nor nuts be tightened, until the pressure has been entirely removed. The occurrence of leakage, in a pipe or fitting or elsewhere, is often an indication that there is a weakness at that point, or that the parts are improperly fitted together. In making up pipe into fittings some of the threads may be destroyed if the work is not done carefully; and when the fittings are bolted together there may also be stripped or defective threads on some of the bolts. It is evident that no good can be accomplished in cases of this kind by overstraining the already weakened parts in any way, and safety requires that the pressure should be taken off before an attempt is made to remedy the trouble. A thorough and complete examination of all the parts can then be made, and the repairs can then be properly handled and without danger to the operator.

Leakage is often caused by poorly fitting gaskets around manholes and handhole openings, by worn or displaced valve packings, or by corrosion. In every case of this kind the trouble should be remedied in a workmanlike way and not by trying to force a fit by screwing up a nut so as to seriously overstrain a bolt that may already be carrying all the load which should be allowed upon it. The attempt is often made to stop leakage around the header caps of sectional boilers by setting up the nuts that hold them. Threads may be stripped in this way when the attendant knows well enough that the real trouble is that the caps do not seat properly, owing to corrosion or to the accumulation of scale or dirt on the bearing surfaces. The only possible gain is the saving of a little time and trouble, and the chance of accident accepted in such cases is altogether too great a price to pay in return for trivial benefits of this kind.

Corporation Morality and Business Unrest

The leading article of the public utilities number of the Chicago *Herald*, published on June 30, was contributed by Timothy S. Williams, president Brooklyn Rapid Transit Company. Mr. Williams discussed the effect of past corporation practices upon the present business unrest and said in part:

"Measured by practical results of business enterprise, what justification is there, or has there been, for recent legislation or official administrative action that has reduced earning capacity of city transportation and industry, forced thousands of men out of employment, impoverished widows and orphans dependent upon the income of investment, imposed excessive and burdensome taxes, and actually threatens the right of property supposed to be secured by the Constitution?

"Take the case of the steam railroads—is there any real or general dissatisfaction with rates or service? If some railroad investors have made excessive profits, a very much larger number have made losses, and the great majority have had unreasonably small returns. In the meanwhile, whether railroads were struggling to meet operating expenses and interest or not, every individual affected by railroad operation has been a beneficiary. There is not any product of capitalized human effort so cheap to-day, considering the great cost of production, as transportation.

Value of Public Utilities

"What is true of the steam railroads is equally true of other public utilities—the street railways, the telephones, the electric lights. The expansion and consolidation of street railways have made possible the growth and development of cities corresponding to what steam railroads have done for the country. They have been important factors also in improving the social conditions of cities. They have made it possible to relieve congestion of population—to enable the workers of small means by reason of low fares to have their homes where children can be brought up under healthful conditions, with fresh air and sunlight and wholesome exercise.

"With all the abuses which have accompanied prosperity's growth, the material results have not suffered net injury therefrom. The stimulus to enterprise and investment even under bad influences and by means of wrongful practices has given to the people lower rates for transportation, illumination and telephones, and lower prices for monopolistic products than would have been brought about without that stimulus.

"The inherent and principally controlling cause of business troubles is the feeling engendered throughout the country by the exposure of some conspicuously flagrant misdeeds of business, due to plain violations of some very old moral maxims. Owing to the activities of politicians violating the same maxims, the punishment inflicted, instead of being, as it should have been, personal to the offender, has been unjustly meted out to enterprise and effort generally, and the sins of a few fathers of industry and finance seem likely to be visited upon the children of many generations.

Remedy for Present Conditions

"What is the remedy for existing conditions? Is it still more drastic legislation? In government ownership and operation of public utilities? In more severe regulation, covering additional activities? Even in government price-fixing of exchangeable commodities? And finally, perhaps, in a radically changed form of government—socialistic, despotic or anarchistic? It is to be hoped not. Some men in public utility work urge the education of the public to clearer economic and political views, to closer acquaintance with the difficulties and burdens of discharging corporate obligations. This is proper, but the most important thing is to make the people forget and respect, and this can be done only by convincing them that business is conducted honestly, sincerely and fairly.

Corporate Morality

"The standard of morality is vastly higher in business life to-day than it is in political life. The fact that the larger part of the country's business is done through the medium of corporations presents in itself the opportunity for encouraging a high plane of conduct. For the corporations are after all merely the organized expressions of individual aims and substance, and the list of stockholders are a constantly increasing constituency.

"In such organizations there are behind corporate activities the sentiments and convictions of citizens who are stockholders and who, as a rule, prefer to intrust their investments not only to those who are capable but to those who are honest and intelligently progressive. The day has passed in large corporations when any individual stockholder or any combination of stockholders can, if disposed, force dishonest methods or fraudulent practices upon their operating staffs.

"If I am right in these observations as to present ideals among the managers and stockholders of corporations, then it is only a question of time when public sentiment will change. When the public is once convinced of corporate sincerity and honesty we need have no apprehension of the ravages of demagogues and politicians. We can then state our problems frankly to the people, confident of their intelligent co-operation and support."

Other Articles

Two other articles in the public utilities number of the *Herald* of interest to electric railway officials are those written on the subjects of intangible values and of small-denomination bonds by L. R. Nash, of Stone & Webster, Boston, and J. W. Wilder, of N. W. Halsey & Company, New York, respectively. Mr. Nash says that the last year has witnessed some noteworthy developments with reference to certain elements which enter into "fair value" for rate-making purposes. There is reasonable consistency among the state commissions in determining the costs of physical property and the "overhead" charges in connection therewith. On the other hand, there has been radical disagreement in the treatment of so-called "intangible" values. The broad contention underlying the decisions of courts, however, is that public utility enterprises involve other elements of value on which return should be allowed than the existing physical property. Such property is only the "bare bones" of a system which, as a whole, is a live, serviceable entity.

According to Mr. Wilder, bond houses are awakening to a new opportunity in the sale of small-denomination bonds. The time has passed when a little investor can offer as an excuse for not buying high-grade bonds that these bonds are not issued in $100 denominations. Furthermore, he is being educated to their benefits by widespread campaigns of education through magazines and newspaper advertising, booklets, correspondence and the personal solicitation of salesmen. There can now be found on the lists of the most responsible bond houses issues which come in denominations of $100 and $500 as well as $1,000, and the bond houses are going after the business of the small investor as well as that of the man of wealth. A bond house will even assist the small buyer by letting him purchase bonds on partial payments.

American Association News

Meetings of Committee on Way Matters and Joint Committee on Claim Accounting Result in Formulation of Recommendations—Convention Exhibit Plans Making Encouraging Progress

COMMITTEE ON WAY MATTERS

A meeting of the committee on way matters to pass upon reports to be presented at the annual convention was held at the board rooms of the Washington Railway & Electric Company on July 17 and 18. Those present were the chairman of the committee, C. S. Kimball, engineer of maintenance of way Washington Railway & Electric Company; E. H. Berry, engineer of roadway Cincinnati Traction Company; C. H. Clark, engineer of maintenance of way Cleveland Railway Company; E. P. Roundey, engineer of maintenance of way New York State Railway, Syracuse Lines; W. F. Graves, chief engineer Montreal Tramways Company, and R. C. Cram, assistant engineer way and structure department Brooklyn Rapid Transit System.

After considerable discussion the committee adopted reports upon "The Use of T-Rails in Paved Streets" and "Alloyed Steel Rails." A supplementary report on "Interurban Tracks" was also considered, but the committee concluded that there was not sufficient time to give the matter attention this year and the report will be turned over to the committee on subjects for such action as it may see fit to take. The committee had also collected interesting information regarding the topic "Pavement for Use in Connection with Girder and High T-Rails," but, as there was not sufficient time to give the subject the attention it deserved, the material will be turned over to the ensuing committee. In response to a request that this year's committee present T-rail standards for consideration of the convention, the decision was reached that it would be unwise to go into this matter this year and the correspondence on the subject will be turned over to the secretary for the use of the committee on subjects.

JOINT COMMITTEE ON CLAIM ACCOUNTING

A meeting of the committee on claim accounting was held in New York on July 27 and 28. It was attended by H. J. Davies, secretary Cleveland Railway, and P. C. Nickel, claim agent New York Railways, co-chairmen, and H. K. Bennett, claim agent Fitchburg & Leominster Street Railway. The committee considered a scheme of classification of accidents which had been prepared in preliminary form. This will be revised and sent to all members of the joint committee for approval.

ATLANTIC CITY CONVENTION

The accompaying illustrations show the marked improvements in appearance which have been made in the interior of Machinery Hall, Atlantic City, in preparation for the convention of the American Electric Railway Association next fall. The front part of Machinery Hall, which was used as a power plant for years, has been refloored, repainted, the ceiling and pillars covered with lattice and the floors with Crex. This space will be used as a rest and reception room. The rest of Machinery Hall, that is Machinery Hall proper, has been repainted, recarpeted, and furnished with easy chairs and is used as a rest and reading room for pier patrons. There will be no high partitions between the main building and Machinery Hall as in former years.

The removal of these partitions now makes Machinery Hall a part of the main building. A good view of it can be had from the main entrance to the pier.

Mr. McConnaughy, of the Manufacturers' Association, calls attention to the fact that the championship baseball games occur at about the same time as the convention. He fears that this may interfere with the preparation of the exhibits and, as everything must be ready on Saturday, strict attention to business during the week preceding the convention will be necessary. Mr. Eldredge will not deliver goods or furnish help on Sunday, and all Saturday night and Sunday work will be charged at double time.

MACHINERY HALL IMPROVEMENTS—FRONT OF HALL, SHOWING NEW LATTICE WORK

MACHINERY HALL IMPROVEMENTS—SOUTH SIDE OF HALL, SHOWING REPAINTING AND REMOVAL OF PARTITIONS

The following new companies have been enrolled as members in the Manufacturers' Association during the week ending July 30, 1914: Prest-O-Lite Company, Inc., Indianapolis, Ind., and Street Railway Signal Company, Philadelphia, Pa.

Under the caption of Foreign Trade Opportunities, No. 13,390, the *Daily Consular and Trade Reports* contains a note to the effect that an American consular officer reports the need of a new electric light plant for a city in his district. Contracts have been signed for carrying out this work. The contractor states that most of the material to be used will be imported from the United States. It is also probable that an electric tramway will be built. A copy of the complete report containing further details can be obtained from the Bureau of Foreign and Domestic Commerce, United States Custom House, New York, or 629 Federal Building, Chicago, Ill.

COMMUNICATIONS

The Economy of First-Class Maintenance

Southwestern Electrical and Gas Association
Dallas, Tex., July 28, 1914.

To the Editors:

In the article by "Contributor" on the subject of manganese renewable-wearing-part special work there is evidenced not only ingenuity in overcoming the difficulties of replacing the worn parts but, also, an appreciation of some particular points that are nearly always at the bottom of the complaints as to trouble with pieces of special work and with straight track itself. I refer particularly to the second and last paragraphs in which he speaks of the necessity of extra first-class work in original construction and later maintenance and of the necessity of constant inspection.

It is safe to say that, outside of some elevated and some underground roads, and at points on surface roads where there is very congested traffic, the average street railway, even in the large cities, pays less attention to the proper inspection and true maintenance of its track and special work than it does to any other portion of its property, and this in the face of the fact that its track is often the most costly section of that property, is subject to wear, tear and abuse that is beyond its control and is the most difficult portion of the property to properly and thoroughly inspect and the most costly to repair. It would seem that such an array of adverse and difficult conditions would naturally lead to the most perfect installation that was possible, to an inspection that caught the stitch before it dropped and to a "maintenance" that maintained and did not content itself with mere "renewal or repair."

"Contributor" contributes a vital truth, unheeded by most track and roadway departments, when he says: "The cost of constant effort in this direction (true inspection and maintenance) is a very small percentage of the money value of special track work which becomes unfit for use on account of early and unnecessary disintegration."

He could have gone further and applied this to the whole track and to the cars running thereon, for the character of track is a large factor in the life and cost of maintenance of every portion of the rolling-stock.

When one considers the great initial cost of track materials and the extraordinary cost of replacing any portion of them, especially in city streets and during operation of the cars, it would seem that, of all the different sections of the property, the track and roadbed would be that which would receive at least as careful inspection and maintenance as the power station, the overhead or underground lines and the rolling stock. Instead of this and excepting, possibly, the current return circuit, track is trusted to inexperienced men, usually to a "track foreman" and a gang of track hands. Even where there are men of higher rank in the track and roadway department they are apt to be "technical" and "office" men, engineers, draftsmen, designers and superintendents rather than "practical detail" men trained and competent to insure proper inspection and prompt and thorough maintenance.

Were the subject not so serious financially, the contrast between the liberality with which the average street railway treats the inspection and maintenance of its power station, rolling stock and its transmission lines, and the costly stinginess with reference to the exact and timely inspection and maintenance of its track would be ridiculous. Here is track that nearly equals in original cost all the other portions of the property, that costs from 50 to 100 per cent more to replace, but its inspection is either neglected and reports of trouble are allowed to come through thumping cars and derailments, or else the whole matter of inspection, report and repair is left to those whose only instruments of precision are an iron track gage, a wooden level and a bundle of "shims."

In an article on another item of track construction written some time since, the writer said this: "A piece of new track so laid that there is no lost motion whatever between its component parts is in position to maintain itself in that condition for a long time; whereas a piece of new track with lost motion, or the opportunity to produce such early, is already in process of disintegration. The one is a compact unit, resisting as a whole; the other is a cluster of self-destroying pieces."

And I would say further that what is true of new track is equally true of track in use. If the integrity of the "compact unit" is properly maintained, if threatened lost motion and undue wear are caught when their very first symptoms are manifested and the original integrity is promptly restored, the life of the track and rolling stock is greatly increased and repairs and power loss are greatly decreased.

There is no part of a system of a street or interurban railway that pays so good a rate of interest on perfect construction and maintenance as the roadbed and track, and there is no portion that is so neglected in construction and maintenance. Track that costs from $15,000 to $20,000 per mile and whose "rate of depreciation" is high under the best conditions, is left to the tender construction mercy of a partially supervised contractor or a "gang boss." "Inspection" is left to motormen or conductors, and "maintenance" to a track boss to whom an eighth of an inch is a miscroscopic refinement of measurement. And this not only applies to the little "neck-of-the-woods" electric railway company but to almost every street railway in the larger, and even largest, cities in America. I have yet to see a street railway system where, while riding in its cars, I could not pick out joints, blocks and whole streets and sections that told their tale of faulty construction and faultier maintenance through the car.

In these days of "scientific management" and "efficiency engineering" it seems astonishing that more exact and particular attention is not paid to this subject. The manufacturers of rail, fastenings and special work are willing and anxious to better their products if the way is shown them, but their efforts are liable to be brought to naught by the neglect, carelessness or ignorance of those who install and use their products. What would be thought of the constructor of a central station who built his engine and generator foundations unstable and out of level, who assembled the parts by rule-of-thumb and fastened them together insecurely? What would be thought of the chief engineer whose prime movers were continually thumping, heating and "getting out of whack," whose auxiliaries were out of efficient commission about half the time? And yet these are the average conditions of a large proportion of the street railway track of the country. Outside of some sections of a few cities where track has been in use some time and has been properly built and maintained and excepting brand-new track, smooth, free-riding track is an exception. It is, ordinarily, "bump, twist and rattle" to the discomfort and annoyance of the passenger, and the mutual destruction of track and car. For "bad track" is not only a contagious infection to the cars that run on it but it is a mutually cumulative evil, the worse the track the greater the deterioration produced by the cars and the more the track injures the cars, increases the fuel bill and swells the accident-damage account.

We are spending large sums for costly and intricate

machines that repair while we refuse to pay the price of the human instruments that would prevent. We buy unpickable locks for the empty stable of the stolen horse and yet grudge a good one or a watchman for the next new stable and horse that we buy.

It is true that track is mostly "out of sight," but that is no excuse for its being "out of mind." It is true that it is subject to use and abuse by the general public over which we have no control, but that fact should not be a deterrent of foresight on our part. It should make us the more careful in our construction and maintenance; it should be an added factor for which we must provide fully. It is true that as we now build track many of its parts come to us crude, rough, scaled, rusty, dented, bent, loose and of anything but exact size, but is not this the greater reason why we should remove the defects before we put them in place?

Then we should inspect and keep on inspecting, not with a hammer or a car wheel or a derailment, but with trained men equipped with suitable instruments. Having accurate information, we should not merely repair or replace but should so do the work that the fault discovered shall never occur again.

It may be said that such refinement would increase track cost to a prohibitive amount. As a matter of fact it would increase slightly the initial cost of construction but, in reality, it would be an "insurance charge" to be distributed over the increased life of the track and paying big dividends on a comparatively small increase of investment.

Similarly the amount devoted to proper inspection and true maintenance should not be considered as merely an increase in operating expense. If a 10 per cent increase in operating expense in one place saves ten times its amount in another, that "expense" is really an "investment." H. S. COOPER.

Indianapolis as an Interurban Center

INDIANAPOLIS TRACTION AND TERMINAL COMPANY
INDIANAPOLIS, IND., July 27, 1914.

To the Editors:

Referring to the letter of S. H. Ankeny of the Greater Dayton Association, published in the ELECTRIC RAILWAY JOURNAL of July 25, requesting information as to how Dayton ranks as an interurban center, I give below for comparative purposes the total number of interurban passenger and freight cars arriving at and departing from the Traction Terminal Station at Indianapolis for the year 1913, number of passengers carried, and daily averages in each case.

There are five interurban companies operating fourteen lines out of the Indianapolis terminal as follows: Terre Haute, Indianapolis & Eastern Traction Company—Brazil Division (Indianapolis to Terre Haute), Eastern Division (Indianapolis to New Castle and Richmond), Northwestern Division (Indianapolis to Lafayette), Crawfordsville Division, Danville Division and Martinsville Division; Union Traction Company of Indiana—Northern Division (Indianapolis to Peru and Fort Wayne and Indianapolis to Logansport), Indianapolis to New Castle and Muncie, Indianapolis to Anderson, Muncie and Fort Wayne, and Indianapolis to Marion; Indianapolis & Cincinnati Traction Company—Greensburg Division and Connersville Division; Interstate Public Service Company—Indianapolis to Louisville.

YEAR OF 1913
Arriving and Departing—Traction Terminal Station

Total passenger cars	246,823
Total freight cars	23,501
Total number interurban and suburban passengers	6,524,366

AVERAGE PER DAY—YEAR 1913

Interurban passenger cars	676
Interurban freight cars	64
Interurban and suburban passengers	17,875

On account of the interruptions to travel caused by the floods during the last week in March, and the strikes which occurred during the latter part of the year, the above figures are somewhat below normal.

HARRY H. LLOYD.

Progress of French Electrification

A recent issue of the *Revue Industrielle* contains a list of electric railways in France, including steam lines which have been electrified, electric lines in course of construction and lines that are under consideration.

The electric lines of the French State Railways now in operation include Paris-Invalides to Perpignan, 6 miles; Paris to Auteuil, and Champs de Mars, 9 miles; Paris to Versailles, 16 miles; St. Cloud to Etang-la-Ville, 10 miles; Paris to St. Germain, 15 miles; and Asnieres to Argenteuil, 3 miles; making a total of 59 miles.

The Paris-Lyon-Mediterranean Company has in operation a line between Le Fayet, Chamonix and Vallorcine, 22 miles; the Orleans Company, the Paris-Juvisy line, 14 miles; and the Midi Company, the Perpignan-Bourg Madame line, 64 miles, and others from Montrejeau to Luchon, 23 miles; from Lannemezan to Arreau, 16 miles; from Tarbes to Bagnere-de-Bigorre, 14 miles; from Montrejeau to Pau, 70 miles; from Lourds to Pierrefitte, 13 miles; from Pau to Bedous, 37 miles, and from Buzy to Laruns, 12 miles. Out of a total of 350 miles electrified no less than 249 miles are on the Midi system.

At the present time 96 miles of new electric railways are in course of construction, namely, Auch-Lannemezan, 24 miles; Castelnau-Magnoac-Tarbes, 32 miles; Arreau-St. Lary, 7 miles, and Hagetmau-Pau, 33 miles. A further 80 miles of electric railways are awaiting government sanction before the work of construction is taken in hand, viz., Quillan-Belesta, 16 miles; Villefranche-Vernet les Bains-Sahorre, 6 miles; Montlouis la Cabanasse Quillan, 55 miles, and Bourg Madame to the Spanish frontier, 4 miles.

Hydroelectric Development in Chippewa Falls, Wis., District

Through the merger of the Chippewa Valley Railway, Light & Power Company with the LaCrosse Gas & Electric Company, the latter a subsidiary of the American Public Utilities Company, the parent corporation now controls and operates the new property under the name of the Wisconsin-Minnesota Light & Power Company.

The new company owns hydroelectric generating plants, with a present installed capacity of 10,000 hp, on the Chippewa and Menomonie rivers in the State of Wisconsin. The largest development is situated on the Menomonie River at Cedar Falls and comprises a reinforced concrete dam and power house of the most modern type with a present capacity of 5300 hp. The capacity of this plant may be doubled at any time by the installation of two additional units, space for which is already provided. The other plants are located as follows: On the Menomonie River, three miles below Cedar Falls, an installation of 1600 hp capacity; on the Chippewa River at Chippewa Falls, two installations with a capacity of 2400 hp, and at Eau Claire, a small development furnishing an additional 700 hp.

By means of high-tension transmission lines this power is available for electric power, light and street railway purposes in Chippewa Falls and Eau Claire, and for the operation of the interurban railway connecting these two cities. The company owns a total of over 100 miles of transmission lines.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Rebuilding Summer Cars to Center-Entrance Type

BY G. M. CAMERON, MASTER MECHANIC NEW YORK STATE RAILWAYS COMPANY, ROCHESTER LINES

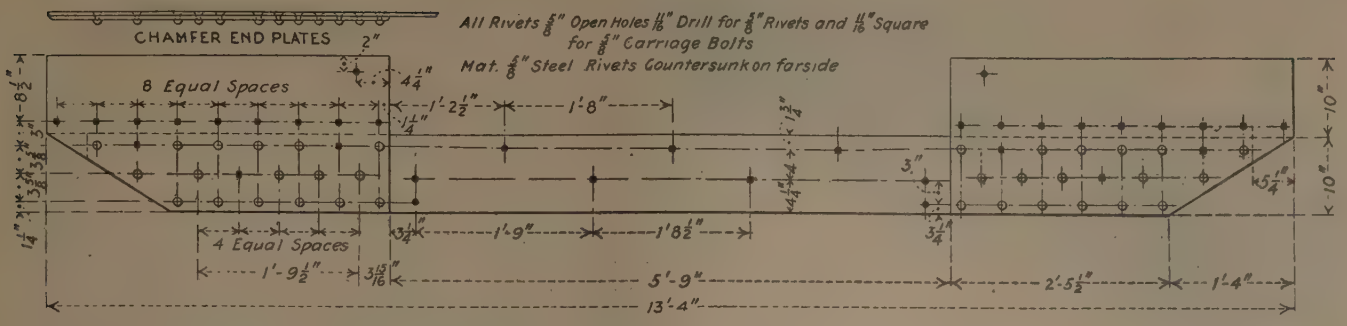
The New York State Railways, Rochester, N. Y., has operated eighteen open cars during the summer months for several years. These cars were of the cross-bench, running-board type. On account of the extended running boards along the sides of these cars, they were found to be somewhat dangerous for operation and especially so where large crowds were handled. It was also very difficult to collect the fares when these cars were crowded. Early in the present year the mechanical department made a study of a method for remodeling these cars in such a way as to eliminate, as far as possible, the objectionable features enumerated.

A plan and elevation of the cars before remodeling are shown in one of the accompanying drawings. As the motor equipments for these cars are used on snow plows and sweepers during the winter months, and as some dimensions of the cars were not suitable for making closed cars for service during the entire year, it was decided to retain the open feature. Two methods were open for consideration: One was to build a vestibule of the usual prepayment type on one end of the car and arrange the seats on each side of a center aisle; the other was to cut out one sill near the center and build in steps with a lowered sill at this point properly reinforced. Estimates and plans were made up for both methods, and the center-entrance scheme was followed, as it was more economical and was believed to be a better plan from the operating standpoint.

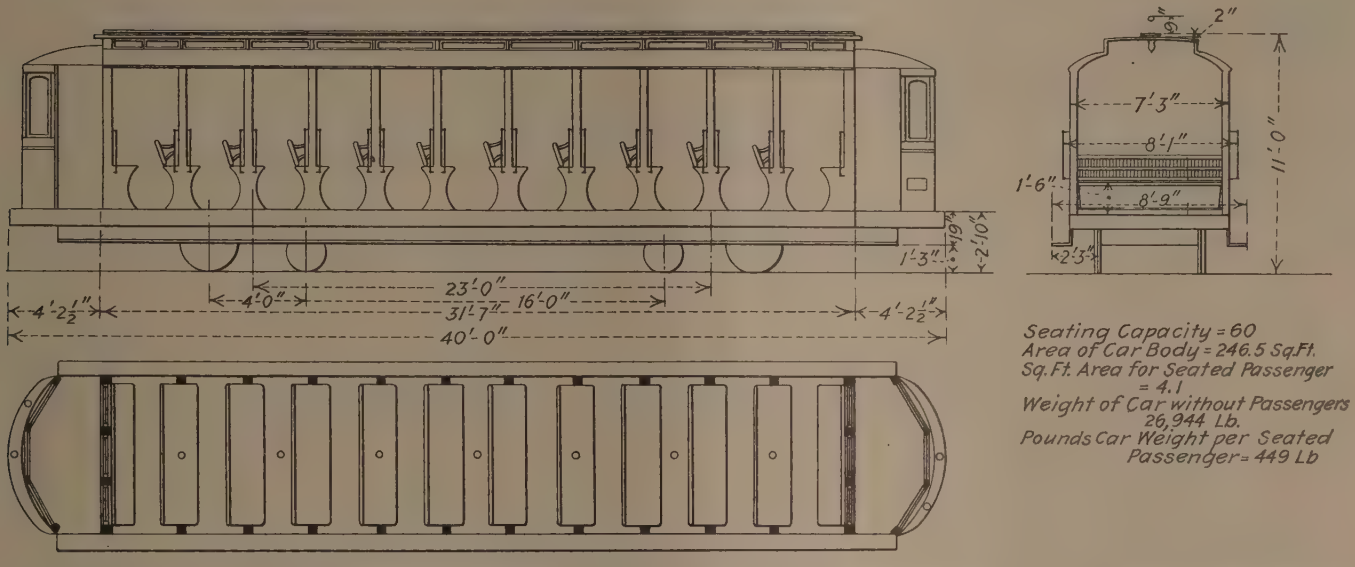
Steel-plate panels were attached to the car posts. These plates extend from the sills up to the usual window heights, and a neat wood rail was placed around the top. From this rail up the car was left open, no sash being used. High window guards were placed along the open spaces. Longitudinal seats were placed along both sides of the car and seats built in across each end. The wood cross-benches were placed end to end and adapted for the longitudinal seats. The cars were originally equipped for operation from either end, but the rebuilt cars are adapted for operating from one end only. Accordingly, the bulkhead partition was removed from one end of the car and seats were carried out to that end. At the entrance a piece of the side sill was cut out and a lower sill attached and securely fastened at the ends of the original sill. A $\frac{5}{8}$-in. steel reinforcing plate was run along the outside of this lower sill and attached to the main reinforcing plates by means of ample gussets. One step was built within the inclosure and a folding step arranged to extend out from the car body when doors are opened. Two pairs of wooden doors with glass panels were installed at the center opening. These doors are arranged to be operated in unison by the New York State Railways standard overhead operating mechanism. The outward step is arranged to fold in conjunction with the operation of the doors. The center opening is divided into two parts, the one to the rear or left being used for the entrance and the one to the right for the exit of passengers. A fare collection stand is placed within the car. At the time of remodeling, the cars were also equipped with air brakes and electric starting signals. This signal

ROCHESTER CAR RECONSTRUCTION—INTERIOR OF REBUILT CAR EQUIPPED FOR SERVICE

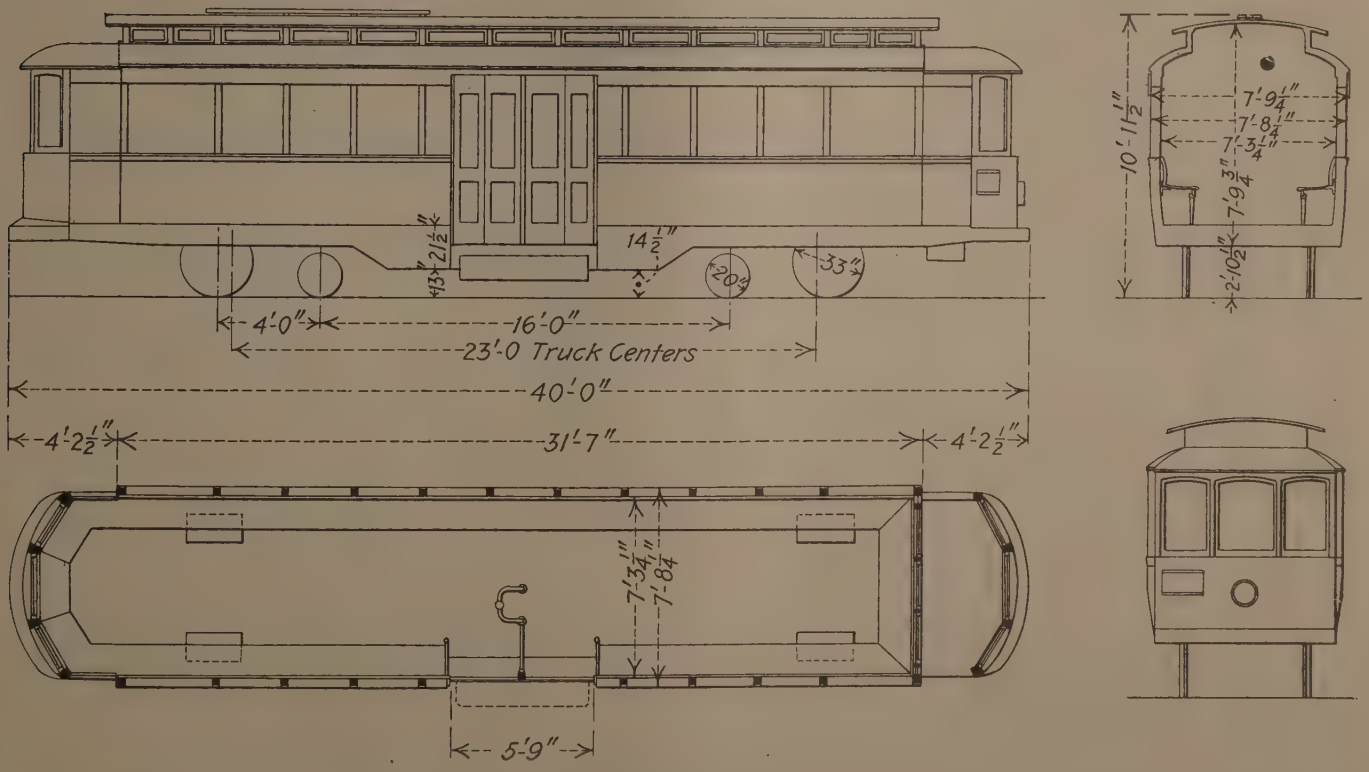
ROCHESTER CAR RECONSTRUCTION—OPEN CAR AS CONVERTED CENTER-ENTRANCE SINGLE-END CAR



ROCHESTER CAR RECONSTRUCTION—STEEL DROP SIDE SILL FOR REMODELING OPEN CARS



ROCHESTER CAR RECONSTRUCTION—ELEVATIONS AND SEATING PLAN OF BENCH-TYPE OPEN CAR BEFORE REMODELING



ROCHESTER CAR RECONSTRUCTION—ELEVATIONS, SECTION AND PLAN OF CAR AS REMODELED

consists of a lamp located in motorman's cab which lights when the doors are closed. The steel work was purchased from a local concern, framed and ready for installation. The total weight of the rebuilt car fully equipped is 26,000 lb. This brings the weight per passenger seat to 530 lb.

These remodeled cars have been in service for nearly two months and have proved their worth, especially when large crowds are handled. They have also been very satisfactory to the crews operating them. A second drawing shows a plan and elevation of cars after their reconstruction.

The Practical Side of Vacuum Car Cleaning—Layout

BY S. L. GUTHORN, E.E.

When distributing vacuum from a stationary plant for cleaning purposes, the principal factor which determines the outlet location is transmission losses in the hose. Not that the losses in hose vary greatly from those of pipe of corresponding size, but because convenience of operation and established practice always fixes the former as much smaller. Depending upon the selection of the diameter only, even within the province of standard lengths and sizes, the displacement losses vary from less than 25 per cent to more than 50 per cent.

The accompanying displacement versus hose length curves, their discussion and the conclusions therefrom, clearly establish the foregoing statements. Examining these curves for a few critical values, we note that of the 90 cu. ft. of air displacement at the hose outlet, there is available as free air at the end of 50 ft. of hose 70 cu. ft. if transmitted through a 1½-in. hose, or a loss of 22 per cent, i. e., 78 per cent is available; 62 cu. ft. if transmitted through a 1¼-in. hose, or a loss of 31 per cent, 69 per cent being available; 54 cu. ft. if 1-in. hose is used, or a loss of 40 per cent, 60 per cent being available.

At the end of 100 ft. of hose with the same initial displacement of 90 cu. ft. we note: 68 cu. ft. of free air for the 1½-in. size, or a loss of 24 per cent; 53 cu. ft. for the 1¼-in. size, or a loss of 41 per cent, and only 42 cu. ft. for the 1-in. size, or a loss of 53 per cent. Comparing these values, we note that in the case of 1½-in. hose an increase from a 50-ft. to a 100-ft. length causes only a loss of 2 per cent compared with a loss of 9 per cent for 1¼-in hose and of 13 per cent for 1-in. hose.

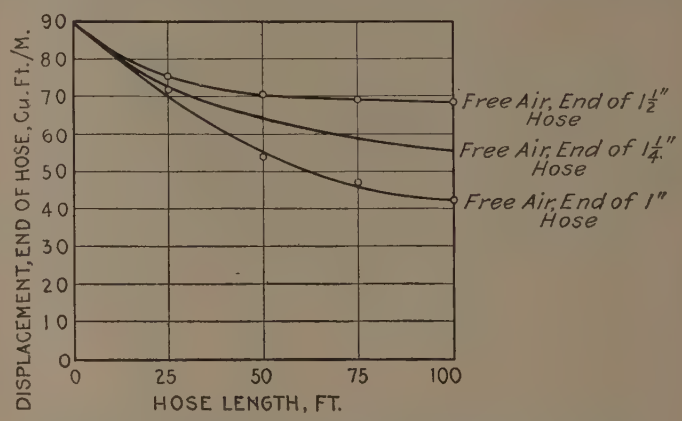
From these examinations we may conclude that for 1½-in. hose the loss for the first 50 ft. is least and that the increased loss due to an additional 50 ft. is negligible. Therefore good and uniform sweeping performance is assured under conditions of service where varying lengths of hose will be required. This is evident from the flatness of the curve. For 1¼-in. and 1-in. hose the loss in the first 50 ft. is greater and is too considerable for an additional 50 ft. length to be neglected, thus giving inferior service should variable lengths of hose be required.

These facts are within 5 per cent for all practical displacements. Larger sized hose has not been discussed because it is too cumbersome, it lacks mechanical strength when made in sufficiently light weights and it is not sufficiently flexible when strong enough. Smaller sized hose is absolutely inadmissible because the ordinary materials swept will obstruct it, the transmission losses are prohibitive and their variation with respect to length is too great to warrant uniform sweeping.

Where possible, in the pipe layout for car cleaning in shops, the distance between adjacent outlets should equal two car lengths, i. e., 100 ft. for 50-ft. cars. This will permit cleaning with a 50-ft. or 60-ft. length of hose and the cleaning of two cars or four cars if tracks are adjacent for each hose connection, thus saving the shifting of hose. It is also advisable to locate the first outlet of a series one car length from the bumpers. This will insure the outlets being in line with the platforms and will eliminate taking hose through the windows. Only one set of outlets is necessary for each two tracks. If local conditions require 100 ft. of hose for cleaning never use the 1-in. size.

The pipe layout should always be the shortest possible. This is invariably accomplished by extending the main longitudinally, with branches at right angles and parallel with the ties, rather than the reverse. Since this arrangement will not involve any additional pipe for an outlet for each track, the sufficient condition of one outlet for two tracks as above set forth may be doubled.

All piping should decrease in size as it branches out and extends from the exhauster, but no pipe should be less than 2 in. All deflections should be made by means of long-turn drainage fittings, plugged for cleanout, and so placed that the cleanout is trailing and not facing the material conveyed. A minimum pitch of 1 ft. in 50 toward the exhauster is desirable. The complete reaming with a reamer and not a file of all pipe ends is absolutely essential. If the condition of the soil will permit black pipe is preferable to galvanized, unless the latter is free from lumps of zinc due to early freezing of the bath.



RELATION BETWEEN AIR DISPLACEMENT AND HOSE LENGTH

For determining the capacity of plant necessary for a given shop, allow 3000 sq. ft. per hour per man, which for a car 50 ft. x 9 ft. allows six to seven cars per hour per man.

The cost of the plant will vary with the type of exhauster, method of separation and disposal of the materials swept, type of control and nature of current available. A reliable plant, complete and ready for operation, but exclusive of the piping, will cost from $500 per sweeper in a small plant to $400 per sweeper in a larger unit. Others may be purchased for half this price.

Terms have been agreed upon between the Italian government and the subconcessionary company constructing the Ambertide-Todi-Terni railway and the branch to Ponte S. Giovanni Perugia for the conversion of the system to electric traction. Instead of a subsidy of 7500 lire per km ($2,400 per mile) for seventy years, the government is to pay 10,000 lire ($3,200 per mile) for fifty years, and to accept 15 instead of 20 per cent of the profits. These modifications are induced by the special importance of the projected lines, and the advantages accruing to the public by their electrification.

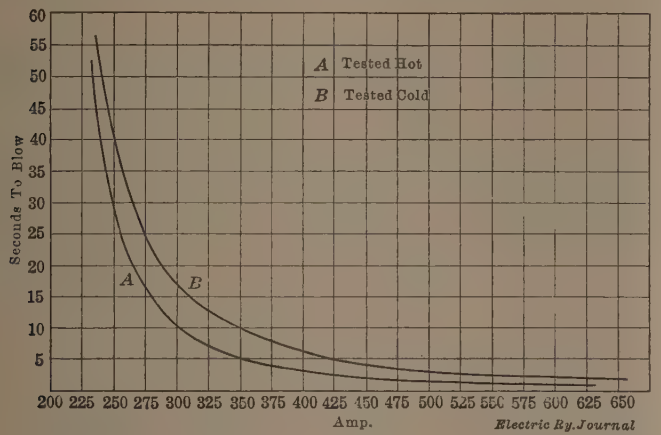
Equipment Defects—Fuses, Fuse Blocks and Fuse Boxes—I

BY C. W. SQUIER, E.E.

The electrical equipment of all cars should be protected by a device which will automatically open the circuit under abnormal conditions, as great losses may be caused by overloads or short-circuits. This automatic form of protection is, therefore, an exceedingly important one, and too much care cannot be exercised in its selection. Fuses are the most elementary type of devices for performing this function. At first they were made of metals with a low melting point such as lead, but as the capacities needed increased other metals such as zinc, copper and aluminum were found to be better adapted because a less volume of material is required to be melted when the fuse is blown.

Open Fuses and Inclosed Fuses

The first types of fuses were open and usually consisted of a porcelain block with terminals to which a piece of lead wire was attached. Such fuses have the objectionable features of the spattering of melted metal and the consequent fire hazard when they open the circuit; also they cannot be rated accurately or be depended on to blow uniformly due to the exposure of the fusible strip. To overcome these objections cartridge or inclosed fuses have been developed.



OVERLOAD TIME ELEMENT CURVES OF 150 AMP FUSES

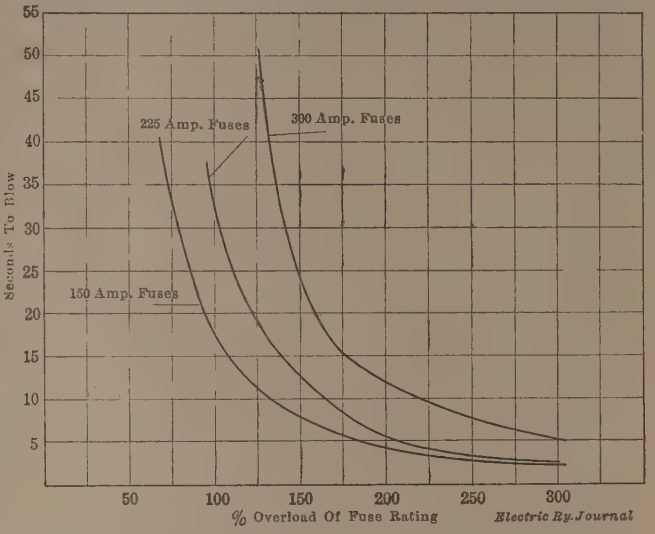
Inclosed fuses have the fusible element inclosed within a tube of fiber or paper which is filled with a refractory material to keep out the air and to aid in the breaking of the arc when the fuse blows. Suitable terminals are provided at either end for mounting the fuse easily and quickly in a fuse block. Each manufacturing company developed a line of fuses to its own dimensions. As a result fuses of the same capacities but of different makes had different dimensions. The different manufacturers also rated their fuses differently, some fuses being rated at their maximum carrying capacity while others were rated at about 80 per cent of this capacity.

Standardization

The lack of uniformity in fuses resulted in much confusion. Finally standard dimensions and ratings were agreed upon at a conference which was held between representatives of the Underwriters' National Electric Association and the fuse makers. Fuses conforming with this standard are known as National Electric Code standard fuses, and all the principal manufacturers now make them. This standard divides inclosed fuses into classes according to their voltage and ampere capacity, and dimensions are specified for each class. Fuses are rated so that they will carry indefinitely a current 10 per cent greater than their rating; and with a current 25 per cent greater than that at which they are rated, they will open the circuit without reaching a temperature which will injure the fuse tube or the terminals of the fuse block. With a current 50 per cent greater than their rating and with a room temperature of 75 deg. Fahr., fuses starting cold must blow within the following specified times:

0-30	amp	1 min.
31-60	amp	2 min.
61-100	amp	4 min.
201-400	amp	12 min.
401-600	amp	15 min.

This standardization of fuses has been of great value to operating companies, and much credit is due the members of the Underwriters' committee and to the various fuse manufacturers for their co-operation. The dimensions of fuses were carefully worked out and are as small as it is safe to make them. The use of special dimensions for fuses, and particularly those smaller than the standard, should be discouraged.



CURVE SHOWING THAT TIME ELEMENT FOR FUSES LENGTHENS AS THEIR CAPACITY INCREASES

Fuse Testing

To blow a fuse it is necessary to heat up the fuse metal to its melting point, and this takes a certain length of time depending on the amount of current passing through the fuse. This overload time element, or time lag, as it is commonly called, decreases rapidly as the current increases. One cut shows overload time element curves for some 150 amp 500-volt inclosed fuses. Two classes of tests were made; the first, shown by curve *B* starting with the fuses cold, namely, at the temperature of the surrounding air which was about 70 deg. Fahr.; the second, shown by curve *A*, was made after raising the temperature of the fuses to the degree of heat that they would reach in actual service on cars. Tests which had been previously made on fuses in service to determine what this temperature should be indicated that 170 amp flowing through the fuses continuously for 7¾ minutes would raise their temperature approximately the same amount as was obtained by the intermittent conditions of actual service. When tested cold, the time was taken from the instant the current was turned on till the fuse blew, this current being kept constant by means of a water rheostat. The tests of the fuses hot were made by placing 170 amp through the fuse for 7¾ minutes, then increasing this to overload con-

ditions and taking the time from the instant the current was increased till the fuse blew. By referring to the curves it will be seen that these particular types of fuses will carry currents below 225 amp indefinitely, that they will open the circuit with 250 amp flowing in forty seconds when cold and twenty-eight seconds when hot, and also that with 400 amp through the fuses they will open the circuit in 6¼ seconds when cold and three seconds when hot.

The time element for fuses lengthens as their capacity increases. This is illustrated by the second set of curves, which show the time necessary for three different sizes of fuses to open the circuit with an overload a certain per cent of their normal rating. With 200 per cent overload these 300-amp fuses required twelve seconds to blow, to 5½ and four seconds respectively for the 225 and 150-amp fuses.

The Installation of Grid Resistors, Motor Leads and Fuse Boxes

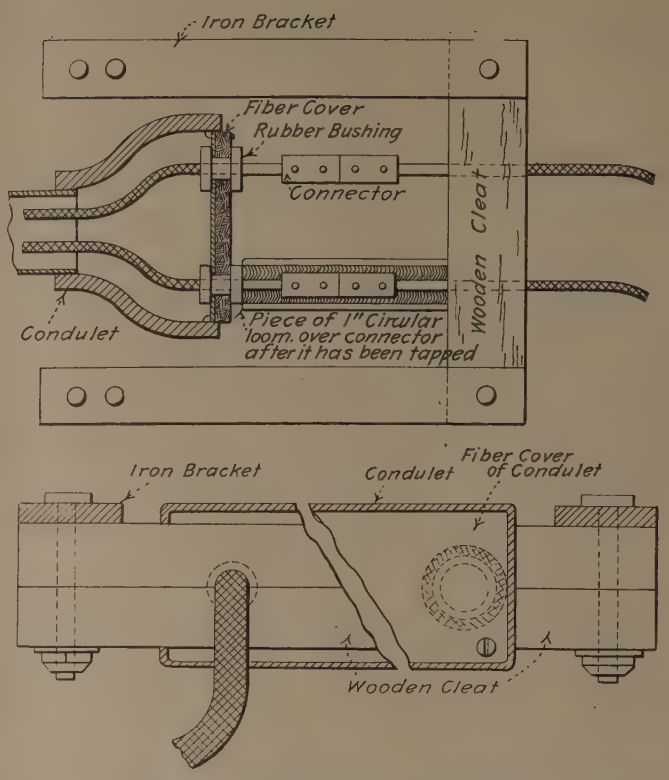
BY R. H. PARSONS, ELECTRICAL FOREMAN

The accompanying sketches show arrangements of resistance, motor lead and fuse box connections to illustrate approved methods of installing these parts.

Fig. 1 represents a set of three-box resistors, suspended with iron hangers from the car floor or framework to which are fastened two wooden hangers covered with asbestos lumber. A sheet of ¼-in. asbestos lumber is placed below the wooden hangers, and the grids are attached under the asbestos by bolts through the wooden hangers. Care should be exercised to allow sufficient space between the grids and between the two outside grids and the iron hangers. The iron hangers should be grounded.

Fig. 2 illustrates the resistors and their conduit connections. It will be noted that the wires are separated as they leave the fiber cover of the condulet and that they touch nothing until they reach the terminal of the grid. As a rubber bushing lines the fiber outlet to the condulet, it is safe from grounds and short circuits.

Figs. 3 and 4 are top and front views of a good layout



FIGS. 3 AND 4—TOP AND FRONT VIEWS OF SAFE ARRANGEMENT OF MOTOR LEAD CONNECTORS

for motor lead outlets and connections. It consists of a condulet similar to the Type A with a fiber cover having two outlet holes. These holes are lined with a rubber bushing. At a point 2 in. out from the bushing the terminal is soldered on to the wire. At each side of the condulet, at intervals of 6 in., are fastened two flat iron brackets which extend for a length of approximately 12 in. A split cleat is bolted across the ends of these brackets to hold the wires securely. The connector receives a layer of friction tape, and a piece of circular loom cut to fill exactly the space between the condulet and cleat is slipped over the conductor, the whole

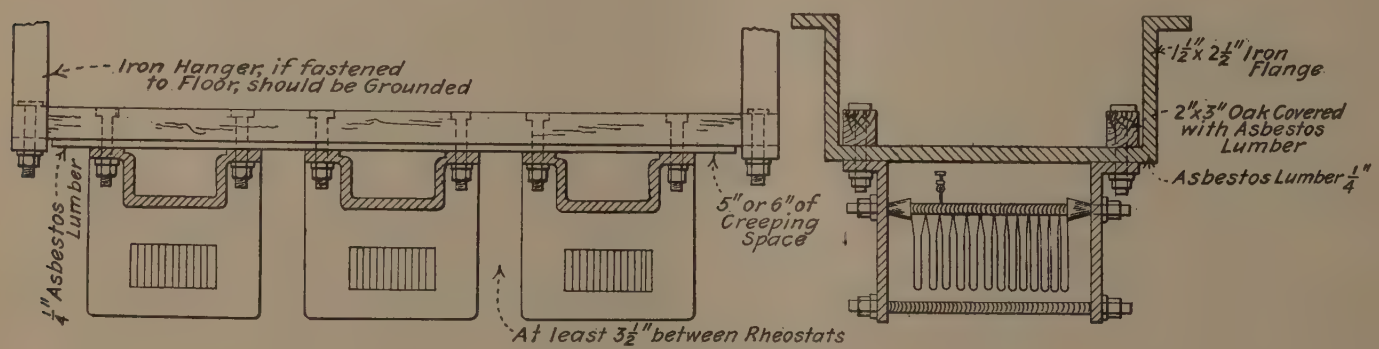

Iron Hanger, if fastened to Floor, should be Grounded
1½" x 2½" Iron Flange
2"x3" Oak Covered with Asbestos Lumber
Asbestos Lumber ¼"
¼" Asbestos Lumber
5" or 6" of Creeping Space
At least 3½" between Rheostats

FIG. 1—FRONT VIEW OF A SAFE INSTALLATION OF GRID RESISTORS

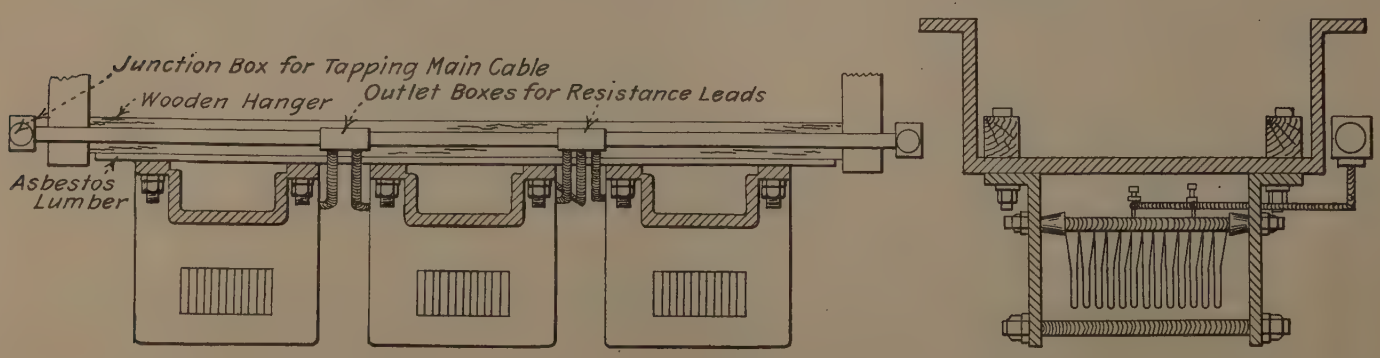


FIG. 2—VIEWS OF GRID RESISTORS SHOWING METHOD OF ARRANGING CONDUIT AND LEADS

making a well-insulated job which will not be affected even by water.

Fig. 5 illustrates a safe way to suspend a ribbon fuse box. The fuse box is first bolted to a hard wooden board, but with a layer of ¼-in. asbestos lumber intermediate. The board in turn is then bolted to the floor, platform framework or other convenient part of the car, with 2-in. wooden fillers between. This arrangement gives an air space between the fuse box and the board and between the board and the floor, enabling the parts to dry out quickly after they have been subjected to water. It also gives a sufficient insulation for the fuse box, the asbestos lumber affording protection in case a loose connection or heavy arc subjects the wood above to flame. It is also best to run the conduit which carries the wires not less than 4 in. or 5 in. from the fuse box.

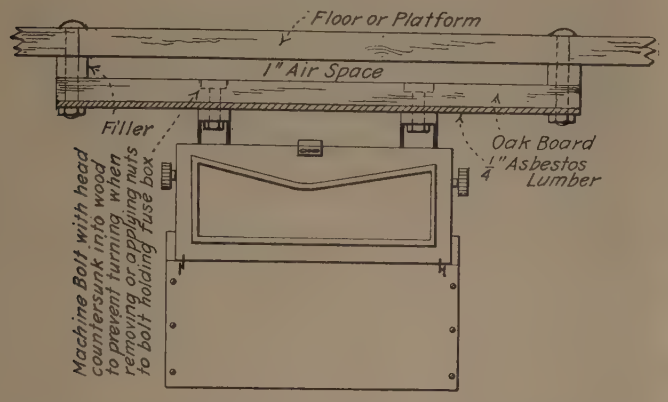

Floor or Platform
1" Air Space
Filler
Oak Board
1/4" Asbestos Lumber
Machine Bolt with head countersunk into wood to prevent turning when removing or applying nuts to bolt holding fuse box

FIG. 5—SAFE METHOD OF INSTALLING A RIBBON FUSE BOX BENEATH THE FLOOR OF A WOODEN CAR

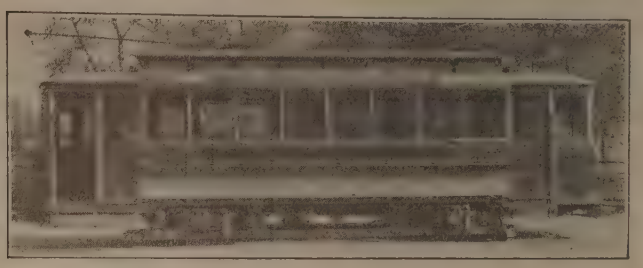
Radial Axle Truck Adapted for Sharp Curves

BY FRED STEFFENS, MASTER MECHANIC ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY

The writer has recently secured a patent on a radial axle, long wheelbase truck, of the type shown in the accompanying drawings and halftones. This truck was built in our shops and the latter part of April it was put under car No. 12. It made its first trial trip on April 30, when it was taken over all the worst tracks and curves in St. Joseph. Although the truck was new and rigid it did not refuse to go over any of our tracks. It entered regular service under car No. 12 on May 1 and has been in service ever since. The truck frame is 22 ft. 5 in. long over all. The wheelbase is 15 ft., which the writer believes is the longest ever built to run under a car successfully. This wheelbase was used because the car would not take a longer truck; otherwise the writer would have built the truck with a 16-ft. or 18-ft. wheelbase, as his design is adapted for lengths as great as 25 ft.

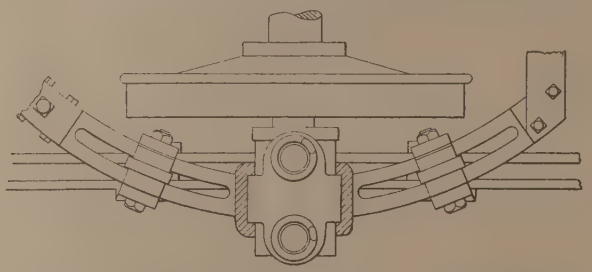
Car No. 12 is 22 ft. 8 in. over the corner posts, and 36 ft. 9 in. over the bumpers. Previously it was mounted on an 8-ft. wheelbase Dupont truck. Thus the overhang and the oscillation were so great and the swing was so heavy when it entered a curve that very unsatisfactory service followed, but the use of a radial axle truck makes it ride as steadily as a double-truck car.

This truck is equipped with a curved horizontal frame which nearly encircles each axle, as shown in the drawings. At the intersection of this curved frame and the normal position of the axle, the frame carries an inverted "U" member which can slide vertically outside and above the adjacent journal box. On each side of the journal box the curved frame is provided with concave runways on which rollers are mounted. Normally these rollers rest in the lowest portions of the runways, but when the trucks turn a curve they run up the runway for a distance proportional to the degree of curvature. Gravity tends to return the rollers to the lowest positions when the trucks return to straight track.



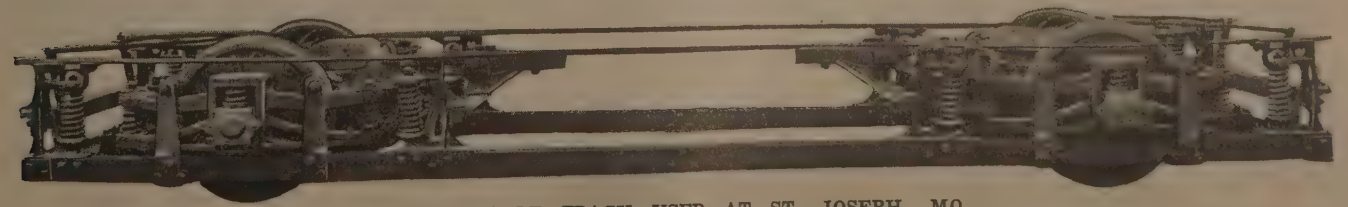
ST. JOSEPH CAR WITH RADIAL AXLE TRUCK ON CURVE

However, to assure the prompt return of the axles to their proper position each truck has a supplemental spring actuated mechanism of the character shown in the plan view. It will be seen that the middle point of the circular frame carries a lever which is pivoted on a vertical pin. At the other end of this lever are two mounted friction rollers against which two leaf springs bear. These springs are secured to an angle bar and press toward each other, thereby resisting the movement of the lever from the central position. After the car wheels have turned a curve and are on a straight track the springs assist the hanger rollers to return the axle and car wheels to their proper position. In going up or down grades the leaf springs insure the proper positioning of the axle relative to the frame in case the runway rollers alone do not effect this function.



DETAIL OF ROLLER MECHANISM AT JOURNAL BOX

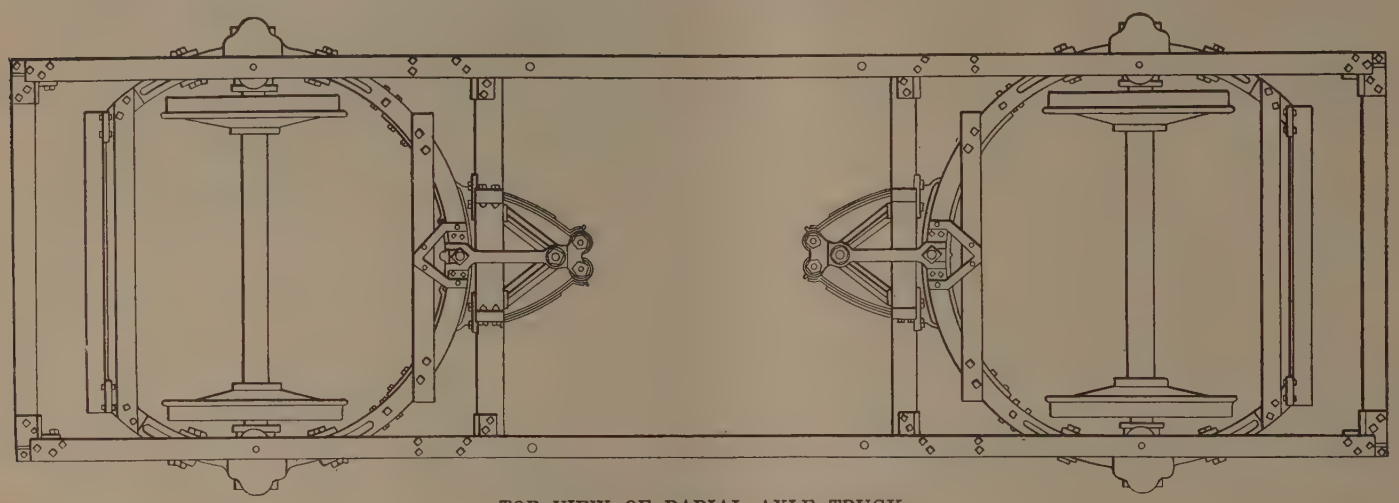
While in this particular truck the car body supporting frame connects the two pairs of wheels, it will be readily seen that each pair of wheels are in a frame by themselves. They could be separated by leaving out the center top and bottom plates, and continue to work



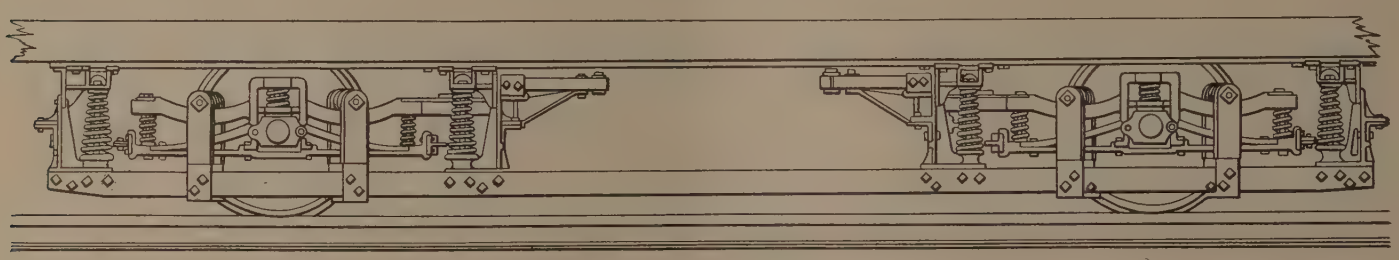
RADIAL AXLE TRACK USED AT ST. JOSEPH, MO.

just as well if not better in case a wheelbase longer than 14 ft. is used. This radial truck should supersede all other single or double trucks for two-motor equipments, for since it permits the weight of the motors to be carried on two axles instead of four it gives better propelling power and therefore less skidding, spinning and energy consumption.

This truck has the best brakes on our system, although we have several kinds of brakes. We use many types of single trucks, double trucks and maximum traction trucks. Some of these have very good brakes, but none that will compare with the brakes on this truck. Car No. 12 is equipped with National straight air brakes and two GE-80 motors. This truck is unlike other radial trucks now in use. In the others the wheelbase has been lengthened from 8 ft. to 10 ft. and 12 ft. This does away with the oscillation, but introduces a snake movement which is worse than the oscillation. The writer's truck does away with all undesirable movements.



TOP VIEW OF RADIAL AXLE TRUCK



SIDE VIEW OF RADIAL AXLE TRUCK

Diesel Electric Cars in Saxony

The Saxon State Railways have had constructed two Diesel electric motor cars, which they propose to try on the line between Dresden, Coswig and Meissen, for passenger traffic. The cars have been built by the Rastatt Works, and the Diesel equipment supplied by Sulzer Bros., Ludwigshafen, while the electrical equipment is by the Brown Boveri Company, Mannheim. The Diesel motor is of the six-cylinder type, of 200 to 250 hp, at 400 to 450 r.p.m. Coupled direct with the motor is a d.c. dynamo of about 190 hp, which supplies energy to the motors, of which there are two, each wound for 300 volts. The car is on two trucks, one of which has three axles and the other two axles. The Diesel motor and the dynamo are carried on the three-axle truck and the working motors on the two-axle one. At each end of the car are third-class compartments with accommodation for ninety passengers, as well as cabs for the driver. The car weighs about 70 tons. It is able to run at a speed of 43.4 m.p.h. on the level, or to haul a trailer at a lower speed. The car is fitted with the Westinghouse two-cylinder air brake. For electric lighting a battery is provided, charged from the dynamo. The Diesel motor cylinders are water-cooled, the heated water being discharged in summer, but in winter it is passed through tubes to heat the car.

Electric Motor Trucks for City and Suburban Service

There are few classes of electric railway service in which rolling stock is subjected to conditions more severe than those found in city and suburban work. Among the causes contributing to this are excessive overloading, frequent starting and stopping, accompanied by rapid acceleration and heavy brake applications, and shocks caused by frequently passing over switches and crossings. The brunt of all this must be borne by the trucks, which should be of light weight in order to reduce energy consumption as far as possible, but which must at the same time be of ample strength to stand up with a minimum expense for maintenance.

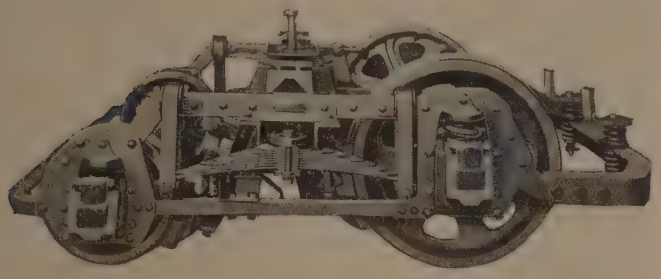
The illustrations show two types of Baldwin trucks which are specially fitted for work of this character. The truck for the Conestoga Traction Company represents the type built by the Baldwin Locomotive Works for city service where a single motor equipment is desired. This truck has a carrying capacity of 14,600 lb. on the center plate, and is operated at speeds up to 30 m.p.h. The track gage is 5 ft. 2½ in., and the sharpest curves have a radius of 32 ft. 6 in. The truck wheelbase is 54 in. The motor is outside-hung, and is spring-supported on a piece of angle iron which extends across the truck and is bolted to the side frames. The latter are supported on coil springs placed over the journal boxes, while the bolster is supported on two half-elliptic springs which are hung from the side frames by swing links. The driving and pony wheels are of chilled cast iron, their respective diameters being 33 in. and 21 in., while the journals measure 3¾ in. x 7 in. and 3 in. x

6 in. Commercial shapes are used as far as practicable, in this type of truck; and the simplicity of its construction and the ease with which it can be repaired commend it for service where severe conditions must be met.

The truck for the Philadelphia & Garrettford Street Railway is used in suburban service, running at speeds

TRUCK FOR PHILADELPHIA & GARRETTFORD STREET RAILWAY FOR SUBURBAN SERVICE UP TO SPEEDS OF 40 M.P.H.

up to 40 m.p.h. This truck is of the equalized pedestal type without end frames. The transom gussets are of sufficient strength to hold the frames square and prevent diamond pointing. Equalizing beam springs of the twin helical pattern, and double elliptic bolster springs insure excellent riding qualities. A special feature of this truck is an angle-iron brace at one end, which is secured to the pedestals to support the sand



TRUCK FOR CONESTOGA TRACTION COMPANY WITH CAPACITY OF 14,600 LB. ON CENTER PLATE

pipes. This truck is built for a track gage of 5 ft. 2¼ in. The wheelbase is 78 in., and the wheels are of solid rolled steel, 34 in. in diameter. The journals are 4¼ in. x 8 in. The carrying capacity on the center plate is 21,100 lb.

Reverse-Power Relays for Protection of Parallel Feeders

The need for a reliable reverse-power relay has been appreciated for a long time, particularly in substations fed by parallel feeders. In case of a short-circuit or ground on one feeder a selective reverse-power relay that will not operate on overload is the only means for completely isolating the feeder, the reversal of power at the substation end causing the relay on the defective line only to operate. The accompanying diagram explains this.

The diagram shows two parallel feeders from the generating station to the substation. For simplification, the layout is single-phase, but three-phase operation is similar when three relays are so connected that voltage and current are in phase in each relay. At the generating station are plain overload relays, set for a comparatively long-time element. At the substation are two sets of Westinghouse selective reverse-power relays, one set for each feeder. When the direction of power is normal, both feeders supplying power to the substation, the reverse-power relays cannot trip their breakers no matter how heavy the load may be.

If a ground or short-circuit occurs at *D* on feeder No. 1 a heavy current will be caused on both feeders, for feeder No. 2 will supply power through the substation and back on feeder No. 1 to the point of short-circuit. Thus the direction of power is reversed at relay *B* in the substation. This reversal of direction of power is the only thing that can cause relay *B* to operate. As soon as circuit-breaker *F* is opened, the load

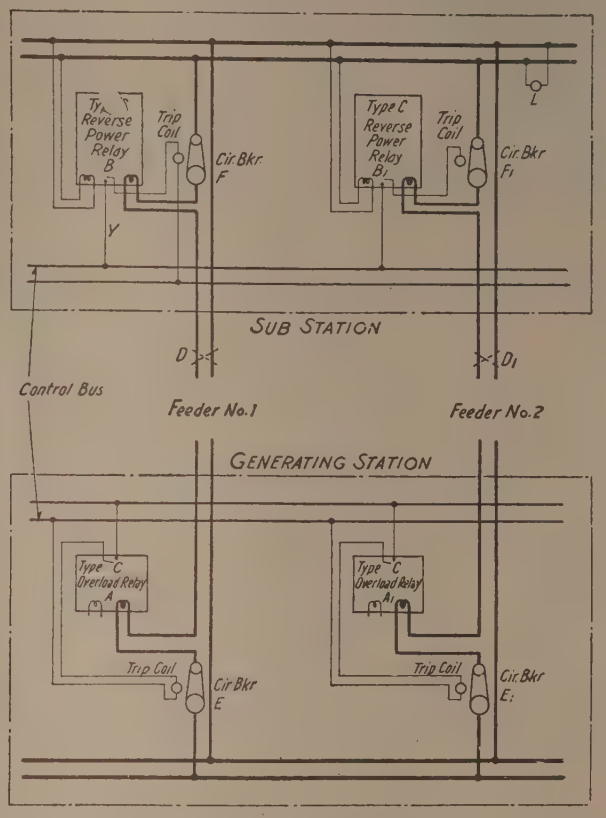


DIAGRAM OF CONNECTIONS OF RELAYS FOR PROTECTING PARALLEL FEEDERS

on feeder No. 2 falls back to normal, and it continues to operate the substation.

This condition is effected in approximately two-fifths of a second after the short-circuit occurs. If the short-circuit continues the overload relay *A* in the generating station will trip its breaker and the line is clear. Similarly, if a short occurs at D^1, reverse power at B^1 will trip the breaker F^1, and an overload at A^1 will trip its breaker. In case of a heavy short-circuit near the substation, the voltage may drop very low, but these relays are so sensitive that they will operate correctly even if the voltage drops to 2 per cent. The Westinghouse Electric & Manufacturing Company furnishes reverse-power relays especially for this purpose.

An interesting experiment to prevent overcrowding was tried recently by the District Railway Company of London on a train leaving Ealing Broadway for the Mansion House. Because of constant growth in passenger traffic the number of trains has been increased, and an extra coach, labeled "Mansion House only," has been added. As the trains, with the added coach, were too long to draw up at the platforms of most intermediate stations, the last coach stopped in the tunnels at the entrance to stations. A special guard is attached to each "Mansion House" coach. If successful, the innovation will probably be extended.

Poles for the Chicago, Milwaukee & Puget Sound Electrification

A tangible sign of the approaching electrification of the Chicago, Milwaukee & Puget Sound Railway, concerning which a statement was published in the ELECTRIC RAILWAY JOURNAL for Jan. 3, 1914, is the shipment of the 45-ft. red cedar poles which will carry the 100,000-volt transmission line of the Great Falls Power Company.

The order calls for 2705 45-ft. and 255 50-ft. poles for use on the transmission lines proper. In addition to this the railway is using 3625 6-in. top 25-ft. poles for a telephone line paralleling the transmission line. All of these poles are being shipped from the Priest River, Idaho, yards of the pole contractor, Lindsley Brothers Company, Spokane, Wash. Every pole is treated with Avenarius Carbolineum by the open-tank process, the immersion lasting for fifteen minutes at a temperature of approximately 200 deg. Fahr. The 25-ft. poles are treated for 6 ft. of the butt and the 45-ft. and 50-ft. poles for 8 ft. of the butt.

New All-Steel Cars for the Albany Southern Railroad

Two 51-ft. all-steel arched roof, combination passenger cars of the neat design shown in the accompanying illustration have been recently placed in service by the Albany Southern Railroad, Albany, N. Y.

The cars, manufactured by The J. G. Brill Company, are mounted on Brill 27-A trucks which are equipped with third-rail brackets and paddle shoes of the General Electric type. The wheels are of 34-in. diameter solid rolled steel. Brakes are of the Westinghouse straight-air type with 12-in. brake cylinder, type M L slack adjuster and P. V. brake valves. All car wiring is in conduit.

The switches are installed on an inclosed panel board inside the smoking compartment. The cars are lighted with fifteen 23-watt tungsten lamps equally spaced on each side.

The seating capacity per car is sixty-two. The seats in the main compartment are of the reversible type with high back and arm rest and with Pantasote covering, while the longitudinal seats in the smoking compartment are of rattan. The floor is of wood and double, and the ceiling is of agasote painted in light green. The interior is finished in a dull cherry. The exterior is of Pullman green and striped and lettered with gold leaf. Other equipment for these cars includes Brill ventilators, Van Dorn No. 6 couplers, Ohio Brass air sanders and double-spring roller bearing trolley bases, GE trolley poles, the Universal Trolley Wheel Company's trolley wheels and Earll No. 7 trolley catchers.

Combined Recording Barometer and Vacuum Gage

One of the most important factors in the economy of steam consumption for power purposes is the absolute back pressure. To reduce this back pressure to a minimum is the office of the condenser, and it is, therefore, most desirable if not absolutely necessary to keep close watch on the condenser. For this purpose vacuum gages and recorders are installed.

DUPLEX PRESSURE RECORDER

The ordinary vacuum gages and recorders, however, do not indicate or record the back pressure directly nor correctly. The vacuum as recorded varies with the barometer at the same time and place, whereas the absolute back pressure in the condenser is independent of the barometric pressure but is always equal to the difference between the two. The nearer the vacuum approaches the barometer, the lower the back pressure and vice versa.

The Uehling combined barometer and vacuum recorder of the Uehling Instrument Company, Passaic, N. J., has been developed to put these two records in juxtaposition on the same chart. With the barometer record used as the base line the absolute back pressure can be correctly read off directly from the chart. The device consists of two float chambers, one connected with a barometric mercury column, the other with a mercury column in communication with the condenser. These columns and double-float chambers are secured to the case of the recorder.

The pens of the recorder are actuated by the floats and move in correct harmony with the barometric pressure and the vacuum.

ONE OF TWO ARCH-ROOF CARS FOR THE ALBANY SOUTHERN RAILROAD

LONDON LETTER

(From Our Regular Correspondent)

The traffic analyses of the past few weeks have proved that the new moving stairways at Charing Cross and Oxford Circus are a success, and plans for the construction of additional stairways are being advanced as rapidly as possible. The Metropolitan and Bakerloo lines will be linked at Baker Street in about three months, and other moving stairways are contemplated at Oxford Circus (to connect with the Central London Railway), Shepherd's Bush, the Bank and Piccadilly Circus. The Underground Railway managers are somewhat baffled by the problem of utilizing the old lift wells and sections of tube left derelict by the installation of the stairways.

In consequence of the conditions imposed by a committee of the House of Commons in connection with the bill promoted by the Great Northern and Metropolitan Railway Companies for the acquisition and joint operation of the Great Northern & City Railway, and for its extension to the Bank station of the City & Waterloo Railway, the scheme has been withdrawn. This tube suffered from a lack of adequate provision to insure its proper co-ordination with other railways. The original intention was to have a physical connection between the tube and the Great Northern Railway near Finsbury Park. With this object in view the tube was built much larger than any of the other London tubes in order that it might admit the Great Northern rolling stock. The completion of this plan, however, had not been adequately secured, and a compromise was arranged by the tube terminating under Finsbury Park station. The working of the new railway was thus hampered from the very outset. Its large size had increased the cost of construction and equipment and made its trains more cumbersome than those of other tube railways, and it was getting no compensation for this in the way of interchange of traffic facilities. Its sale to another railway was a natural solution of its difficulties. The Great Northern seemed the most suitable purchaser, and much surprise was caused the year before last when the Metropolitan Railway purchased the tube. The proposed acquisition met with strong opposition from a large body of the Metropolitan shareholders, most of whom, however, were mollified when informed of the directors' plans for the line. Since the purchase was completed, however, these plans have failed to receive Parliamentary sanction.

At the ordinary general meeting of the Imperial Tramways, the chairman, Sir George White, in referring to the accounts, made some striking statements with regard to the future of motor omnibuses in connection with tramway enterprises. Some time ago this company considered the question of introducing motor omnibuses where it was considered they could be used as feeders to the tramways. A number of these vehicles were put in service on the streets of Middlesborough to the great satisfaction and benefit of the public. The company has secured a large building, formerly used as a skating rink, which is being made the headquarters for a motor department. Sir George White said that public requirements could no longer be met by tramcars alone. His company's experience in Bristol showed that, notwithstanding the smaller carrying capacity of the motor omnibus, the receipts per mile on city and country regular services alike actually equalled the receipts per mile of the tramway cars, while the touring car receipts were 70 per cent more per mile than the tramway car receipts.

As a commentary upon the above paragraph, a few words regarding the West Ham Corporation Tramways are appropriate. This year there is a deficit of more than £14,000, as compared with a deficit in the previous year of slightly more than £3,000, whereas for the year ended March, 1912, there was a surplus of £4,000. The whole of this deficit is attributed to the motor omnibuses now run by the London General Omnibus Company.

The accounts of the Wolverhampton Corporation's electric tramway system are always interesting, as showing the results of the only surface contact system in Great Britain. The results this year are again most satisfactory, although they are now being amplified by those of a motor charabanc service, instituted about three years ago. The average traffic revenue per car mile reached 11.3d., and the working expenses, including power cost, 6.6d. Including renewals, the total expenses per car mile averaged 9.8d., leaving a substantial balance of profit.

To mark the completion of twenty years' operation of the Glasgow Tramways under the management of the Corporation, 104 tramwaymen, who have been in service for that period, were presented with silver badges. Councillor Kirkland, convener of the Tramways Committee, said that in July, 1894, when the tramways were taken over by the Corporation, there were 538 conductors and drivers employed, while at the present day there were 3200 motormen and conductors in the service. Sir James Bell, who was Lord Provost in 1894, said that at that time many people foredoomed the enterprise to failure, but that to-day the tramways were bringing in a large revenue and the service was probably unequalled.

In pursuance of the policy of educating the public in methods of safety on the streets, the Glasgow Corporation Tramways recently displayed on the cars a large placard headed "Always Face Forward," and bearing the Scripture reference "Proverbs, Chapter 3, 23." This was one of a series of weekly texts affixed to the city cars. The verse to which attention was directed reads as follows: "Then shalt thou walk in thy way safely, and thy foot shall not stumble."

The Tramways & Light Railways Association held a two days' conference in Newcastle last month and some interesting papers were discussed. Councillor R. Mayne, vice-chairman of the Newcastle Tramways' committee, read the first paper, his topic being "Features of the Newcastle Corporation Tramways." Other subjects were: "Tramway Experiences in Brazil," by H. M. Sayers; "Standard Tram Rails: A Comparison of English and Foreign Sections," by F. Bland; "Rail Joints: Their Construction and Maintenance," by R. Humphries, of the Birmingham and Midland Tramways joint committee; and "Town Planning in Relation to Local Traffic," by J. A. Brodie, city engineer at Liverpool.

The directors of the British Electric Traction Company, which operates numerous tramway systems in England, have prepared a scheme for the reduction of the company's capital. When the capital was rearranged in 1911-1912 there was no reduction, but the further accumulation of unpaid dividends on the preference shares was arrested. The sum of £908,372, by which it is now proposed to reduce the capital, will, with the existing reserve, fully cover the depreciation in the assets. The amounts now proposed to be written off are 50 per cent of the 6 per cent preferred ordinary stock and 70 per cent of the deferred ordinary stock. The new share capital will consist of two classes of stock only, viz., 6 per cent cumulative preference stock, with priority as to capital, and ordinary stock entitled to all surplus profits and assets.

The select committee of the House of Commons considering the London, Brighton & South Coast Railway bill has decided that the terms of contract for the supply of electricity shall be submitted to the London County Council, which has the power to purchase the electric companies in 1931. The railway thought that the County Council should have no voice in the matter before 1931. The committee has further decided that the railway shall have power to use, but not to sell, its electricity in Croydon, but that the use shall be limited to traction and station lighting. The corporation, as the authorized distributor, objected to another distributor offering a supply of electricity for sale in Croydon.

The work of electrification has progressed so far on the Kingston route of the London & South-Western Railway that delivery of the electric trains intended for the new service is now being made. The first of these trains is already under test upon the District Railway. This train, which consists of three cars, will carry 190 passengers. The coaches are of the compartment type. There is no intention of copying the big open compartments adopted on the tubes, which have never been popular with the average Englishman. The work of electrifying the South-Western service is making rapid progress. The company will not wait for the completion of the electric power station which it is erecting outside Earlsfield, but will, in the first instance, obtain its electrical power from an outside contractor.

A. C. S.

News of Electric Railways

Hearing by California Commission on Solano Project

Further details in regard to the hearing by the California Railroad Commission regarding the Solano land project, in which moneys of the United Railroads of San Francisco were invested by Patrick Calhoun, are now available. The article in the issue of last week was based upon telegraphic advices.

The testimony at the hearing indicated that the funds taken by Mr. Calhoun from the treasury of the United Railroads were withdrawn on receipts said to have been authorized by him and signed by him or in his behalf by certain employees of the company, for amounts varying in size. The treasurer of the company testified that it had been his custom to honor calls of this kind from President Calhoun. He did not suspect any impropriety and carried the payments as cash because they were cash items. Several directors of the United Railroads testified that they knew nothing about the transactions until June, 1913. The testimony was not clear or conclusive as to whether or not all of the $1,096,000 involved in the transaction was invested in the Solano Irrigated Farms project. As the commission took the position that it was unable legally to go into the affairs of the Solano Irrigated Farms, Jesse W. Lilienthal, president of the railway, agreed to do what he could to discover the sources of the money contributed to the enterprise. The hearing has been adjourned to Aug. 14.

As this transaction was placed upon the company's books at a memorandum value of $1 prior to the publication of its balance sheet of a year ago—June 30, 1913—any recoupment that the company may make from the Solano affair will add to its surplus. It is understood that the financial position of the company actually remains unchanged.

Mayor Blankenburg Appoints Utility Experts

With the approval of his co-workers, including the Mayors of New York, Chicago, Cleveland and other cities, Mayor Blankenburg of Philadelphia on July 23 appointed eight men of nation-wide prominence as members of the board of trustees of the National Bureau of Public Utilities Research. This body, as noted in the ELECTRIC RAILWAY JOURNAL of July 4, was suggested by Mayor Blankenburg to the heads of other cities in this country as a means for assisting in the efforts of cities to obtain lower rates from lighting, transportation and other public utilities.

The men selected and their qualifications are as follows:

Louis D. Brandeis, lawyer, Boston; counsel for Interstate Commerce Commission on application of Eastern railroads for 5 per cent increase in freight rates.

Charles R. VanHise, president University of Wisconsin, Madison, Wis.

S. S. Fels, manufacturer, Philadelphia.

Frederick W. Taylor, consulting engineer, Philadelphia; past president American Society of Mechanical Engineers; leader in scientific management movement.

Frederick A. Cleveland, director New York Bureau of Municipal Research; formerly chairman of the President's commission on economy and efficiency.

Leo S. Rowe, professor of political science University of Pennsylvania, Philadelphia; president American Academy of Political and Social Science.

Charles F. Jenkins, publisher, Philadelphia; proprietor of the *Farm Journal.*

Felix Frankfurter, administrator and lawyer, Cambridge, Mass.; professor of law Harvard University; chief legal adviser of the Colonial Administration of the United States under Presidents Roosevelt, Taft and Wilson; played important part in trials of Morse, Heinze and the Sugar Trust.

M. L. Cooke, director of public works, Philadelphia, is quoted as follows:

"The board appointed by Mayor Blankenburg voluntarily to perform this work has been chosen with the idea of securing the services of men who have made notably successful records for themselves, but who are known all over the country as being enlisted beyond the chance of recall in the battle for decency in government and fair dealing in private affairs. Not one of the members is in politics, nor is one of them at the present time a holder of any elective or political office. Their names will guarantee to all cities, and to the customers of utility corporations throughout the country, that the work of the bureau will be pushed with vigor, balanced by experience, and that its activities will have the necessary effectiveness."

It is stated that Mayor Blankenburg will increase the membership of the board by the addition of three or more experts in the near future. According to Director Cooke, the utilities bureau is now ready for business. Such a temporary administrative staff as may be needed to carry on its work between now and Nov. 12, 13 and 14, when the conference of Mayors will be held in Philadelphia, has now been provided. In addition to gathering general data, individual cities will be advised and assisted in making such application of the bureau's researches to local conditions as will be most likely to secure favorable consideration from public service commissions and other similar bodies.

Municipal Ownership Election Injunction Denied

Judge Stephen Young, of Norwalk, Ohio, sitting in Common Pleas Court at Toledo, on July 28 denied the application of John Craig, a taxpayer, for an injunction against the election for municipal ownership of the street railway properties at Toledo, which is set for Aug. 4. The court sustained the demurrer of City Solicitor Thurstin and held that it has no jurisdiction in the premises. John Craig is the nominal plaintiff in the case, although the Citizens' Franchise Association really brought the action, as noted in the ELECTRIC RAILWAY JOURNAL of July 25. It was decided to carry the case to the Court of Appeals at once.

The arguments were completed on the evening of July 27. Judge John H. Doyle, a member of the Citizens' Franchise Association, presented the principal argument for the plaintiff. He asserted that the petitions to initiate the ordinance were filed under neither the old nor the new law. The new law went into effect, he said, on June 8, 1914, while a copy of the petitions, required by the new law, was certified to the city auditor on May 22. If the petitions were legal under the old law, the board of elections had no authority to issue a call for a special election. Neither did the board have authority to call an election under the new law, because the certified copy of the petitions, being filed before June 8, was of no effect and because the signed petitions were not properly certified by the auditor to the board.

W. W. Campbell made the general defense that the 1913 initiative and referendum law was in full effect until the amendatory law went into effect, and that the petitions started under the old law could not be suspended by the new law. The certification of the ordinance to the solicitor was merely an extra precaution in anticipation of the new law, and was not really necessary to make the petitions valid.

Meetings are being held nightly by the Municipal Ownership League. The objections to the municipal ownership plan, as indicated by discussions of the subject, are to the effect that the ordinance is crude in its requirements and in its wording. It has been decided to ask the election board to print the entire ordinance on the ballots.

The franchise committee of the City Council, in session on July 22, deferred action for a week on the sliding scale proposal submitted by the Non-Partisan League. Nothing of importance has yet developed along this line, although both this proposal and that submitted by the Toledo Citizens' Franchise Association were discussed to some extent. After the meeting on July 22 Mayor Keller said that the committee might modify its own proposal and that some fixed rate of fare other than three cents might be considered. He would not go into details, however, and further information along this line was not obtainable.

Mayor Keller on July 24 issued a proclamation calling attention to the election to be held Aug. 4 to pass on "an ordinance to provide for the ownership and maintenance of and operation by the city of Toledo of street railways, electric lighting plants, electric power plants and artificial power plants and public utilities."

Wage Increase in Kansas City

The 3500 employees of the Metropolitan Street Railway, Kansas City, Mo., will, beginning with Aug. 1, receive 1 cent an hour more pay than heretofore, as the result of a recent order issued by Federal Judge William C. Hook. The order, dated July 20, was filed several days later. It covers all employees working upon an hourly basis in the operating, electrical, mechanical and maintenance of way departments, and the increased cost resulting will amount to between $110,000 and $125,000, according to an estimate by the receivers of the company. While the order came from Judge Hook, it was made at the instance of the receivers, as an indication of appreciation of the employees' loyalty during the recent campaign for an extension of the franchise. The company is now working out the details of the wage increase.

The receivers for the company agreed recently to extend to Kansas City, Kan., the half-fare rate for children between the ages of eight and twelve, the use of which began in Kansas City, Mo., on July 20, as noted in the ELECTRIC RAILWAY JOURNAL of July 25. The franchise on the Kansas side provides that any reductions made in Missouri shall be extended to Kansas. The petition asking for the extension was signed by the Kansas City officials and the receivers and forwarded to Judge Hook, who is expected to grant the request without delay.

Much interest was created when the Metropolitan Street Railway, in announcing through the daily papers that the half-fare rate for children was in operation in Kansas City, Mo., selected the Nelson papers, the *Star* and the *Times*, as two of its advertising mediums. Those dailies fought bitterly against the recent franchise granted to the Kansas City Railways, the successor company to the Metropolitan Street Railway. Advertising men were especially interested in the situation, in view of the fact that it is usual for advertisers to patronize the papers which maintain at least noncommittal attitudes regarding projects in which they are interested.

The Kansas City election board announced that a hearing on alleged frauds in the recent franchise election would be held on July 23. The investigation was to be directed particularly to the twelfth precinct of the First Ward, where the vote was 245 to 5 in favor of the franchise. The announcement followed a meeting of the board at which the the names of twenty-three men were presented who were alleged to have said they voted against the measure. It was stated that subpoenas for the judges, clerks and challengers who served in the precinct and for each of the twenty-three voters would be issued.

Merchants and property owners of the downtown district of Kansas City, Mo., have pledged $400,000 of a $500,000 fund to build an interurban station at Tenth and Wyandotte Streets, if the new management of the street railway system will accept that location. It is stated that this location is adjacent to the heart of the shopping district, is accessible from street car lines and offers the least grade of any of the sites proposed. New members have been added to committees to raise the additional $100,000 within the next ten days.

Pittsburgh Wage Arbitration Ended

The arbitration proceedings in the dispute between the Pittsburgh (Pa.) Railways and its employees, noted in the ELECTRIC RAILWAY JOURNAL of July 18, came to a close, as far as the taking of testimony is concerned, on July 20. During the ten days of the hearing the attorneys for the employees of the company introduced more than seventy witnesses, whereas the railway attorneys offered the testimony of only eleven witnesses. The testimony during the latter part of the investigation dwelt with the subject of minimum wage, new uniforms, dinner-hour relief and the character of runs.

George C. Wilson, attorney for the railway, announced his closing argument would be that the wages now paid the employees are too high and in view of the testimony introduced concerning the cost of living in Pittsburgh should be reduced. Mr. Jones, general manager of the company, testified that the employment office of the company was closed from March 17 to June 9 because the company had a sufficient number of employees. He also stated that the company has twenty-five employees who have been in the service for twenty-five years or more.

By the aid of a chart that he had devised Mr. Jones explained how the scheduling of cars will be rearranged so as to give better service and incidentally grant the men more free time at noon and a general improvement in working conditions. According to Mr. Jones' plan, the men are to have one and one-half hours for dinner and the company will pay them for thirty minutes of that time. At present the company handles 31,000 cars in the morning rush hours, 6000 at noon and 28,000 at night, all within half an hour.

Electric Railway Issue in Detroit Election

That the railway issue will again be brought up in the Detroit mayoralty campaign is indicated by the petitions which have been filed by candidates for that office. Mayor Marx, in the course of whose administration the seven-for-a-quarter day-to-day agreement with the Detroit United Railway was effected, is a candidate for renomination on the Republican ticket. He will be opposed by John McVicar, who, it is stated, is to run on a municipal ownership platform. F. F. Ingram, who has announced his candidacy on the Democratic ticket, is also running on a municipal ownership platform, charging Mayor Marx with a surrender to the Detroit United Railway and with the betrayal of municipal ownership.

The appraisal of the railway within the city is proceeding as rapidly as possible under the direction of Prof. E. W. Bemis. Edward Burch, chief assistant to Professor Bemis, in his first report states that the organization required for the appraisal is complete. With 33 engineers at work he expects that the work will be completed within the three months specified in the contract.

Andrew Sangster, public accountant, has been retained by the Board of Street Railway Commissioners to assist in the appraisal of the railway. He will be assisted by eight public accountants. The purpose of examining the company's books is to determine from the vouchers and other records the original cost of the property. Mr. Sangster has previously been connected with the appraisal of the Chicago Telephone Company, the Southern Bell Company, the Omaha Gas Company, the St. Paul Gas Company and the Springfield (Ill.) Gas Company.

Dual Subway Progress in New York

The Public Service Commission for the First District of New York during the week ended July 25 opened bids for the construction of one section of new rapid transit railroad and held a public hearing on the proposed form of contract for the construction of another. Bids were received for the construction of Section No. 5 of Routes No. 4 and No. 36, this being a part of the Broadway-Fourth Avenue subway in Manhattan. This section extends eastward from Fifty-ninth Street and Seventh Avenue to Fifth Avenue, where it divides into two branches, one branch continuing through Fifty-ninth Street and the other through Sixtieth Street to Second Avenue. It will be a two-track section, with stations at Fifth Avenue and Lexington Avenue. According to the unofficial report of the bids, the Degnon Contracting Company, New York City, was the lowest bidder at $2,808,661. The work in this section must be completed within twenty-nine months from the execution of the contract.

The section on which the public hearing was held is known as Section No. 3 of Route No. 33, mainly an extension of the East River tunnel from Whitehall Street, Manhattan, to Montague Street, Brooklyn, for operation by the New York Municipal Railway Corporation. This section will also include part of the connection between the Interborough Rapid Transit Company's East River tunnel, extending from Old Slip, Manhattan, to Clark Street, Brooklyn, and the existing subway at Fulton and Willoughby Streets, Brooklyn. Stations on the New York Municipal Railway Corporation will be at Montague Street and Court Street; and on the Interborough Rapid Transit Company line at Borough Hall. This contract will now be put into permanent form and will soon be advertised for bids.

The commission also opened bids for the construction of station finish on the six stations in Sections No. 1 and No. 2

of Route No. 11-B, the extension of the Fourth Avenue subway in Brooklyn from Forty-third to Eighty-sixth Street. The stations are located at Forty-fifth Street, Fifty-third Street, Bay Ridge Avenue, Seventy-seventh Street and Eighty-sixth Street. Under this contract the stations must be absolutely completed, the work including the electric wiring, all hardware, tile work, mosaic, hand rails, etc. The contractor will be required to finish the work within six months after the execution of the contract. According to the unofficial totals of the bids, the Station Construction Company, New York City, was the lowest bidder at about $250,000.

In compliance with the request of property owners along William Street, Manhattan, and with an opinion of the Appellate Division, the commission agreed to draw up the liability clause in this contract on this district in a different manner. Heretofore the contractor for any section of work assumed all liability resulting from such work. The work in William Street, however, will be through very low and partly made ground, and for that reason the property owners wish the city to be primarily responsible for any damages that may result to their buildings. The commission has acquiesced in this matter, but the contract will be drawn in such a manner that the contractor will still be responsible, although he will have the backing of the city.

Operating Results in Cleveland

According to the report rendered to the board of directors of the Cleveland (Ohio) Railway on July 25, the deficit for June is $59,366, based upon the ordinance allowances. The actual deficit was $170,037. On June 1 the interest fund was $395,942. With a reduction for the ordinance deficit, the fund is now $336,575. Should the deficit for July be as large as that of June, the interest fund will be reduced to a point below the minimum of $300,000. By some it is believed that this will be the result and that the 1-cent charge for transfers will be put into force again about Sept. 1. It is stated that there is little reason to believe that the figures for July will be any more favorable than those for June. The operating revenue for May was $665,513, while for June it was $642,637. The car mileage in June was greater than in May.

The seven men who formed the grievance committee of the local branch of the union recently returned to work. George R. Davies, president of the local branch, said that this did not mean that the effort to secure a modification of schedules and a minimum day of eight hours had been given up. The men might be called back to committee duty at any time and it was possible that the officers of the employees' association might come to the city to take part in the matter. The union has taken no action regarding the repeated proposal of J. J. Stanley, president of the railway, to grant an increase in wages of 1 cent an hour for all men in service one year or more and a minimum day of five hours, as noted in the Electric Railway Journal of July 25.

Revocation of Charters for Proposed Railways.—One hundred and seventy-five proposed street railways in Kansas were eliminated when the Secretary of State revoked their charters for failure to file annual statements and pay the corporation tax. None of the railways ever passed the blue-print stage.

New Automatic Block Signal System Opened.—On July 20 the Rochester & Sodus Bay Railway, Rochester, N. Y., placed in operation its new automatic block signal system for preventing head-on or rear-end collisions. The cost of this improvement was approximately $170,000. The contract for the installation of the system was let in August, 1913. The Wright-Wilson semaphore system is used.

Next Southwestern Electrical & Gas Convention.—At a recent meeting of the executive committee of the Southwestern Electrical & Gas Association, held in Dallas, Tex., July 18, it was unanimously decided that the next annual convention of the association would be held in Galveston, Tex., May 19, 20, 21, and 22, 1915. Further information can be obtained from H. S. Cooper, secretary, 405 Slaughter Building, Dallas, Tex.

Agricultural Expert Employed by Portland Company.—The Portland Railway, Light & Power Company, Portland, Ore., has created an agricultural department in charge of H. E. Cross, Gresham, Ore. Mr. Cross is an expert in farming and agricultural problems and his services will be at the disposal of farmers along the interurban lines of the company. It is the intention of the railway to furnish farmers with the proper information regarding the growing of feed for hog and cattle raising.

Doctrine of Regulated Monopoly Sustained in Idaho.—The Supreme Court of Idaho recently upheld the validity of the order of the Idaho Public Service Commission in which the commission adopted the doctrine of regulated monopoly in public utility service. The commission had refused to issue a certificate to the Idaho Power & Light Company to enter Twin Falls, holding that this community was already adequately served. The court decided the policy of the commission in preventing destructive competition of public utilities was legal.

Joplin Strike Shows No Change.—No changes have taken place in the strike situation on the lines of the Joplin & Pittsburg Railway, Pittsburg, Kan. Neither side has shown a disposition to make advances, though the tie-up had lasted since July 7. A three-year contract was recently signed with the overhead linemen of the company, who had been working on the "white way" at Pittsburg since the strike began. John Fennimore, superintendent and claim agent, signed the agreement for the company in the absence of W. A. Satterlee, general manager.

Legal Rate of Fare Law in Kentucky Voided.—The law enacted by the last Kentucky Legislature seeking to establish the legal passenger rate in Kentucky at 2½ cents has been held unconstitutional by Judge Gregory, of the Jefferson Circuit Court, on the ground that there is no enacting clause in the act, as required by the State Constitution. The Kentucky Traction & Terminal Company, Lexington, Ky., the only electric road in the State affected by the act, has announced that its old rate, which was less than 2½ cents a mile, would be re-established on its lines. This reduction was voluntary on the part of the company.

Women Conductors for Special Charity Work.—Women will be used as conductors on the lines of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., for one day during the second week in October. They will be furnished by the Federation of Women's Clubs, and this organization will be given all money collected in excess of the average daily receipts. The project is in behalf of the children's charities of St. Joseph. Special attractions will be offered at Lake Contrary, a pleasure resort owned by the traction company. The members of the federation are urging a campaign to have owners of automobiles discard them for the occasion in favor of street cars in order to swell the receipts as much as possible.

Pulmotors Free for Public Use.—The Pittsburgh (Pa.) Railways, the Duquesne Light Company and the Equitable Gas Company have made arrangements to give the public the benefit of pulmotors belonging to them. Pulmotors have been placed in stations throughout Allegheny County, and physicians have been encouraged to become acquainted with their use and to call for them in cases of emergency. They are available upon call of any physician free of charge at any hour of the day or night, and when possible an expert employee will accompany the apparatus to supervise its use.

Hearing on Brooklyn Marginal Railroad.—The Board of Estimate and Apportionment of New York City set July 30 as the date for a hearing concerning the plan for the proposed South Brooklyn Marginal Railroad along the waterfront. It has been estimated that this road will cost the city at least $3,831,000. This sum covers construction work, a two-track elevated road from Poplar Street to Forty-second Street, with a surface classification yard at Erie Basin and a surface transfer terminal yard at the Eighth Ward Market. In case the line is authorized, the property required for the railroad and yards not already owned by the city will be purchased at private sale, or the city will institute condemnation proceedings for its acquisition.

Short Strike in St. John.—On July 22 the members of the street railway employees' union in St. John, N. B., went out on strike because of matters arising out of the dismissal of a conductor for a breach of rules. On the evening of July 23 two persons were seriously wounded as a result of rioting. Two of the company's cars were overturned and set on fire. The strike was ended by the signing of an agreement at 10 p. m. on July 24, under which the men returned to work the next morning. All the discharged employees were reinstated except Frederick Ramsey, the president of the union, over whose case the strike originated. Of the eleven other men dismissed, nine returned to work at once, and the cases of two more were take under advisement.

Commissioner Refuses Rehearing to Force Extension.—The Ohio Public Utilities Commission on July 22 refused to grant a new hearing of the case in which the Cincinnati (Ohio) Traction Company was relieved of extending its Warsaw Avenue line to Price Hill in accordance with an ordinance enacted by the City Council. City Solicitor Schoenle has expressed his determination of appealing the case to the Ohio Supreme Court. The complaint of the railway against the extension, sustained by the commission, was noted in the ELECTRIC RAILWAY JOURNAL of July 11. Mr. Schoenle has notified the company that it must reduce its fare to Kennedy Heights from 8 cents to 5 cents, in accordance with an ordinance requiring the reduction when this village came into the city, which recently occurred.

Examination as to Value of Franchise Extension.—Mayor Bennett of Rockford, Ill., has retained an expert of the Illinois Public Utilities Commission to examine the properties of the Rockford City Traction Company and to advise the City Council of the monetary value of the twenty-year franchise extension which the company has asked for. The authorization of the City Council in regard to securing the services of an expert was noted in the ELECTRIC RAILWAY JOURNAL of July 11. Secrecy has been maintained by the joint committee which has the franchise matter in charge, in regard to the name of the expert now chosen. It is reported that the series of demands to be made by the city before a franchise extension is granted include the payment of from 1 per cent of the gross earnings for the first five years up to 4 per cent for the fourth five years, the building of numerous extensions and the interchange of transfers between city and suburban cars. It is not expected, however, that the committee will make a definite report until the commission expert has completed his examination.

Compulsory Depreciation Accounting in Massachusetts.—The Massachusetts Public Service Commission on July 22 issued on its own initiative an order to railroads and street railways warning them to be prepared to show how they account for depreciation. In connection with this order the commission says: "It is manifest that no system of inquiry or of supervising the management of common carriers is sound and enduring which does not adequately take into account depreciation, not only the depreciation caused by ordinary wear and tear but also obsolescence caused by a great variety of things. Unless and until depreciation is taken care of—and shown in the accounts to be taken care of—there is no accurate way of determining whether dividends have been properly paid or whether a floating debt has been properly incurred for lawful purposes. Ultimately the method of dealing with depreciation adopted by the Interstate Commerce Commission is likely to be made applicable by this commission not only to railroads but to street railways as well."

Special Report Printed on Boston Transit Conditions.—The special report of the Massachusetts Public Service Commission and the Boston Transit Commission to the 1914 Legislature on transit conditions in metropolitan Boston has been printed as Senate Documents 448 and 474. In addition to the analysis of traffic conditions and fare problems outlined in the ELECTRIC RAILWAY JOURNAL of March 21, the publication includes twenty-two valuable appendices, with the most modern maps of the Boston transit system, graphic studies of traffic, earnings, seating facilities, etc.; comparisons of steam and electric railway fares within the Boston and suburban district, investment in transit facilities, an analysis of the profitable haul on the Boston Elevated Railway system, statements of rush-hour traffic at Boston Elevated Railway terminals, statements of fare reductions and increases and changes in transfer privileges on the Bay State Street Railway from 1900 to 1913, inclusive; the names of the constituent companies of the Bay State Street Railway, mileage and other data. An interesting account is also given of the inception and present use of the 8-cent inter-company checks now used at Boston.

Injunction against Sea Beach Line Embankment.—Judge Veeder in the United States District Court, Brooklyn, on July 23 issued a temporary injunction against the Brooklyn (N. Y.) Rapid Transit Company, restraining it from proceeding further with the construction of the new Sea Beach line embankment across the Gravesend meadows. Application for the injunction was made by J. Youngs, United States attorney for the district, who asserted that the "fill" being used in the construction was blocking up the navigable waters of Coney Island and Hubbards Creeks, and that unless steps were immediately taken to correct the damage done these two bodies of water would soon disappear. Assistant Engineer Harry T. Kerr, of the United States War Department, and Assistant United States District Attorney L. R. Bick on examination found that the dual subway system operations had caused a complete change in the line of the two creeks, because the soft marshland was unable to bear the weight of the material dumped upon it for the embankment and it had bulged forward into the creek beds. Whether or not the injunction will be made permanent is of grave concern because of its effect on the completion of the Sea Beach work within the contract time.

Improvements for Boston Subway.—The Boston Transit Commission has asked for bids covering the cost of improvements at the Park Street subway station in Boston, which will do away with objectionable curves in the tracks approaching and leaving the platforms immediately below the Common and enlarge the platform areas in connection with the approaching completion of the Boylston Street subway and the future extension of the Cambridge subway to the South Station and Dorchester. The Park Street station is one of the most densely patronized in the world. The platforms at present in use are narrow at their south ends, affording passage for barely more than a single person at their extremities. Under the proposed plan, however, the area of the east platform will be increased from 7200 sq. ft. to 9900 sq. ft., and that of the west platform from 8600 sq. ft. to 12,800 sq. ft. All main tracks will be straightened throughout practically their entire length, with the exception of the loop tracks at the north end. The south entrances to the station will also be slightly altered. Bids will close Aug. 4, the intention being to complete the alterations before the end of the year. Arrangements have been made for immediately utilizing the new incline for surface cars south of the Public Garden, and in about a month the Boston Elevated Railway will begin the installation of electrical equipment in the Boylston Street subway.

Washington Railways Almost Relieved of Paving Expenses.—Through an error of Congressional clerks, the street railways of Washington were recently almost freed from the requirement that they pay for the paving between their tracks. In the final draft of the appropriation bill for the expenses of the District of Columbia government for the next year, the following paragraph was discovered, after the measure had been sent to President Wilson for his signature: "Provided, that where the width of the street, avenue, or road to be paved or completely resurfaced from curb to curb or gutter to gutter, as the case may be, shall exceed 40 ft., the excess, including the cost of intersections or spaces within which street railways are required to pave, shall be paid for one-half out of the Treasury of the United States, and one-half out of the revenue of the District of Columbia." This proved to be an error of the conference clerks who collated the House and Senate amendments. The following has now been written into the bill: "Nothing contained in the District of Columbia appropriation act for the fiscal year 1915 shall be construed as relieving street railways from bearing all of the expenses of paving street or avenues between the exterior rails of the tracks of their road in the District of Columbia and for a distance of 2 ft. from and exterior to such tracks on each side thereof, as previously required."

Financial and Corporate

Stock and Money Markets

July 29, 1914.

There were heavy overnight declines through the entire list on the New York Stock Exchange to-day and all weakly margined stock went by the board. After the initial transactions were made, however, there were evidences of support at the new low level. The exchange for the first time was called upon to stand as a solitary free market in view of international complications on foreign exchanges. Rates in the money market to-day were: Call, 5 per cent; sixty days, 4 per cent; ninety days, 4 @ 4½ per cent; four months, 4½ per cent; five months, 4¾ per cent; six months, 5 per cent.

In the Philadelphia market to-day the general tendency was toward firmness. Philadelphia Rapid Transit closed at 13 @ 13¼ and Union Traction at 40¾ @ 41½.

The stocks on the Chicago market were weak, the prices being lower. Bonds were active at firm prices.

The Boston market showed low levels early to-day with gains toward a normal basis later, with a net gain of over a point in the general list.

The chief feature on the Baltimore Exchange to-day was trading in coal issues. The total sale of stocks was 1033 shares, of bonds $39,000, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 22	July 29
American Brake Shoe & Foundry (com.)	91	89
American Brake Shoe & Foundry (pref.)	137	133
American Cities Company (com.)	*29	*29
American Cities Company (pref.)	60	60
American Light & Traction Company (com.)	327	320
American Light & Traction Company (pref.)	108	108
American Railways Company	37¼	37
Aurora, Elgin & Chicago Railroad (com.)	32½	a40
Aurora, Elgin & Chicago Railroad (pref.)	76	75
Boston Elevated Railway	99½	96
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	50	50
Boston & Worcester Electric Companies (com.)	*6¼	6¼
Boston & Worcester Electric Companies (pref.)	37	37
Brooklyn Rapid Transit Company	91¾	87
Capital Traction Company, Washington	99½	99½
Chicago City Railway	170	170
Chicago Elevated Railways (com.)	22	25
Chicago Elevated Railways (pref.)	75	75
Chicago Railways, ptcptg., ctf. 1	85	a88½
Chicago Railways, ptcptg., ctf. 2	34⅛	32½
Chicago Railways, ptcptg., ctf. 3	6	8
Chicago Railways, ptcptg., ctf. 4	2	a2
Cincinnati Street Railway	a104	104
Cleveland Railway	106	105
Cleveland, Southwestern & Columbus Ry. (com.)	*4	*4
Cleveland, Southwestern & Columbus Ry. (pref.)	*30	*30
Columbus Railway & Light Company	13	13
Columbus Railway (com.)	*53	13
Columbus Railway (pref.)	79½	79½
Denver & Northwestern Railway	*55	*55
Detroit United Railway	80	80
General Electric Company	148½	143
Georgia Railway & Electric Company (com.)	121	120
Georgia Railway & Electric Company (pref.)	86	85½
Interborough-Metropolitan Company (com.)	13⅞	13⅞
Interborough-Metropolitan Company (pref.)	63	58⅜
International Traction Company (com.)	*30	*30
International Traction Company (pref.)	*81	*81
Kansas City Railway & Light Company (com.)	*20½	*20½
Kansas City Railway & Light Company (pref.)	*39	*39
Lake Shore Electric Railway (com.)	6	6
Lake Shore Electric Railway (1st pref.)	90	90
Lake Shore Electric Railway (2d pref.)	22	22
Manhattan Railway	129½	130
Massachusetts Electric Companies (com.)	10¼	10
Massachusetts Electric Companies (pref.)	58	*58
Milwaukee Electric Ry. & Light Co. (pref.)	*95	*95
Norfolk Railway & Light Company	24½	24½
North American Company	72½	70⅜
Northern Ohio Traction & Light Co. (com.)	63½	63½
Northern Ohio Traction & Light Co. (pref.)	97½	97½
Philadelphia Company, Pittsburgh (com.)	38	37¾
Philadelphia Company, Pittsburgh (pref.)	35	35
Philadelphia Rapid Transit Company	15¼	14½
Portland Railway, Light & Power Company	44	44
Public Service Corporation	111	111
Third Avenue Railway, New York	41⅜	37½
Toledo Traction, Light & Power Co. (com.)	20	20
Toledo Traction, Light & Power Co. (pref.)	70	70
Twin City Rapid Transit Co., Minn. (com.)	101⅝	97
Union Traction Company of Indiana (com.)	*11½	*11½
Union Traction Company of Indiana (1st pref.)	*70	*70
Union Traction Company of Indiana (2d pref.)	*14	*14
United Rys. & Electric Company (Baltimore)	27⅝	26¼
United Rys. Inv. Company (com.)	10	7
United Rys. Inv. Company (pref.)	28	25½
Virginia Railway & Power Company (com.)	a50	48
Virginia Railway & Power Company (pref.)	95	95
Washington Ry. & Electric Company (com.)	87	87
Washington Ry. & Electric Company (pref.)	82¾	82¾
West End Street Railway, Boston (com.)	69¼	68½
West End Street Railway, Boston (pref.)	87	85
Westinghouse Elec. & Mfg. Company	78¾	74
Westinghouse Elec. & Mfg. Co. (1st pref.)	122	120⅛

* Last sale. a Asked.

ANNUAL REPORTS

Brooklyn Rapid Transit Company

The comparative statement of income, profit and loss of the Brooklyn (N. Y.) Rapid Transit Company for the years ended June 30, 1913 and 1914, follows:

	1914	1913
Gross operating revenue:		
Transportation	$25,246,452	$23,865,260
Miscellaneous	311,797	287,028
Total	$25,558,249	$24,152,288
Operating expenses:		
Maintenance of way and structure	$2,021,647	$1,678,125
Maintenance of equipment	2,315,990	2,202,208
Operation of power plant	1,463,284	1,421,123
Operation of cars—trainmen's wages	4,520,023	4,062,796
Operation of cars—other expenses	1,696,132	1,572,661
Damages	543,885	605,092
Legal expense in connection with damages	219,759	217,211
General law expenses	65,098	61,934
Other general expenses	822,857	746,870
Freight and mail expenses	325,054	264,324
American Railway Traffic Company—expenses	823	1,112
Total	$13,994,552	$12,833,456
Net earnings from operation	$11,563,697	$11,318,832
Income from other sources	451,771	339,947
Total income	$12,015,468	$11,658,779
Less taxes and fixed charges	6,699,763	7,161,851
Net income	$5,315,705	$4,496,928
Surplus at beginning of year	7,904,607	5,863,812
Coney Island & Brooklyn Railroad surplus at time of acquisition	506,625	.....
Total	$13,726,937	$10,360,740
Other credits to surplus during year:		
Miscellaneous items	30,653	7,484
Settlement of Brooklyn City Railroad suit	582,567	.....
Sale of easement South Brooklyn Railway	738,987	.....
Total	$15,079,144	$10,368,224
Appropriations:		
Accounts written off	$2,315	$28,513
Adjustment of taxes prior years	10,801	*116,255
Adjustment of expenses prior years	*948	66
Supercession and depreciation	174,339	60,522
Amount set aside as reserve	1,500,000	50,000
Dividend on stock outstanding	3,660,048	2,440,770
Total	$5,346,555	$2,463,618
Balance sheet surplus	$9,732,588	$7,904,607

*Credits.

A comparison of the financial results of the Brooklyn Rapid Transit System for the two years shown by the above statement is affected by two special influences, one being the inclusion of the statistics of operation of the Coney Island & Brooklyn Railroad for the last six months of the fiscal year and the other being the conversion into stock of the greater portion of the Brooklyn Rapid Transit Company's first refunding gold mortgage bonds. As a result of these influences the passenger revenues showed an abnormal increase of $1,381,192, or 5.79 per cent. Miscellaneous revenues increased $24,769, or 8.63 per cent, giving a total increase in operating revenues of $1,405,961, or 5.82 per cent.

Higher wages and increased cost of materials are reflected in the operating expenses. Of the total increase for the year of $1,161,097, or 9.05 per cent, $343,523 (20.47 per cent) was for maintenance of way and structures, $113,783 (5.17 per cent) for maintenance of equipment, $457,227 (11.25 per cent) for operation of cars—trainmen's wages, $123,471 (7.85 per cent) for operation of cars—other expenses, $3,164 (5.11 per cent) for general law expenses, $75,986 (10.17 per cent) for other general expenses and $60,730 (22.98 per cent) for freight and mail expenses. Damages showed a decrease of $61,206 or 10.12 per cent in spite of the heavier traffic. The expenses generally showed relatively less increases than the increase in business, except appropriations in connection with employee's welfare work. The net earnings from operation increased $244,865, or 2.1 per cent, while net income showed an increase of $818,777, or 18 per cent. The fixed charges, even after making provision for the interest on the cost of the Coney Island & Brooklyn Railroad shares, reflected a substantial decrease of 6.4 per cent.

An amount of $4,177,000 par value of the refunding mortgage 4 per cent bonds had been converted into stock prior to June 30, 1913. The conversion privilege expired on July 1, 1914, and the total number of bonds converted was $29,619,-

000, leaving outstanding in the hands of the public $3,459,000, and owned by the companies of the system, $18,714,000. The increase of stock by reason of the conversion of bonds was $29,619,000, making the total capital stock on July 1, 1914, $74,520,000. The operating results for the year show a surplus of $5,315,704.86 after paying $553,826.68 of interest on the refunding bonds which have now been converted into stock. With this interest saved the surplus earnings would have been equivalent to 7.87 per cent on the stock if the issued stock on July 1, 1914, after conversion, namely, $74,520,000, had been outstanding during the year.

On June 9, 1913, the number of stockholders was 3,709. On the same date of 1914 there were 6,319, an increase of 2,610, or over 70 per cent. The report states that this increase is accounted for partly on account of the conversion of bonds into stock and partly on account of wider distribution of the company's shares.

According to the report, the burden of taxation continues to increase, crippling the company's ability to furnish the best facilities and service. For the fiscal year the taxes paid by the system were at the rate of over $4,800 per day. Inasmuch as the net return per passenger was less than one cent, it required the transportation of over 540,000 passengers each day to yield profit enough to pay the tax bills. Capitalized at 5 per cent, the annual tax bills would permit an expenditure of over $35,000,000 for added improvements, facilities and extensions.

The year's schedule of track and paving renewals was the largest in the transportation history of Brooklyn, covering more than forty-four miles. The expenditures for maintenance of equipment are also the largest on record. The construction charges (outside of those made for rapid transit additions and extensions under contracts with the city) aggregated $1,543,316. During the year the company lost $248,000 in expenses on account of interruptions of service caused by the operations of contractors for the city in constructing sewers, to say nothing of the loss in earnings. The freight business during the year yielded a gross revenue of $497,569, an increase over the preceding year of $126,716.

The New York Municipal Railway Corporation, which was formed in the interests of the Brooklyn Rapid Transit Company in connection with the latter's dual rapid transit allotments, prosecuted as vigorously as conditions would permit the work of construction and equipment of rapid transit lines required under its contracts with the city dated March 19, 1913. Expenditures for construction and equipment to June 30, 1914, under the city contracts were as follows:

On account of contribution to city-owned lines	$8,230,256
On account of equipment of city-owned lines	1,647,982
On account of additions, extensions, improvements of existing railroads	4,798,868
Undistributed	593,487
Total	$15,270,593

The report states that the operation of the Centre Street Loop has during its eleven months of operation failed to provide the company's preferentials by $219,687, and has also failed to provide the city's charges on the cost of construction of property placed in operation during this period by $310,060, leaving a total deficit in both the company's preferentials and the city's charges of $529,747. The report states that only by merging the operation of this line and the Fourth Avenue subway with the entire new system will the city eventually be able to make them self-supporting.

The system of compulsory medical inspection and free medical attendance for employees excused on account of illness, affecting nearly 10,000 men in the operating department, completed its first year Dec. 31, 1913. A comparison of records of time lost on account of illness for the entire year as to the surface lines, and for the year, exclusive of Sundays and holidays, as to the elevated lines, indicated a reduction of time lost of approximately 24 per cent.

The report states that it is too soon to estimate the full effect of the order of the Public Service Commission under which a new transfer system went into effect on June 1, 1914, increasing the total number of transfer points from 721 to 1008. The passenger earnings of the companies affected, however, fell off during the month $67,827. In regard to fire insurance, it is noted that the companies with a view to finally insuring their own fire risks, have gradually been accumulating an insurance reserve fund, which on June 30, 1914, aggregated $599,197.

Brazilian Traction, Light & Power Company, Ltd.

The first annual report of the Brazilian Traction, Light & Power Company, Toronto, Ont., covering the period from the incorporation in July, 1912, to Dec. 31, 1913, gives the following income statement for the period:

Revenue from securities owned and under contracts with subsidiary companies	$11,266,698
Interest on advances to subsidiary companies	256,698
Total	$11,522,836
Head office, general and legal expenses, interest, discount and exchange	324,343
Surplus available for dividends	$11,198,493
Dividends No. 1, 2 and 3, on 6 per cent preferred shares at 1½ per cent each	$450,000
Dividends No. 1, 2, 3, 4 and 5, on common shares at 1½ per cent each	7,735,495
	$8,185,496
Surplus carried to profit and loss	$3,012,997

The report states that the consolidation of the interests of the Rio de Janeiro Tramway, Light & Power Company, Ltd., the Sao Paulo Tramway Light & Power Company, Ltd., and the Sao Paulo Electric Company, Ltd., undertaken in July, 1912, has been successfully carried out and on Dec. 31, 1913, practically the entire capital stock of these three companies had been acquired by the Brazilian Traction, Light & Power Company, Ltd.

At the conclusion of 1913 the Brazilian Traction, Light & Power Company, after payment of the regular 6 per cent dividend on its ordinary shares, had a credit balance to profit and loss of $3,012,998, apart from the credit balances of the general reserve funds and profit and loss accounts of the subsidiary companies. This credit balance for the Rio de Janeiro Tramway, Light & Power Company, Ltd., amounted to $6,807,374; for the Sao Paulo Tramway, Light & Power Company, Ltd., $5,151,660, and for the Sao Paulo Electric Company, Ltd., $56,112. The combined reserves and surpluses of the Brazilian Traction, Light & Power Company and its subsidiaries at the present time, therefore, total $15,028,144.

The combined net earnings from the operation of the subsidiaries for 1913 showed an increase of $1,709,437 over the corresponding period for 1912. The operation of the Rio de Janeiro division resulted in an increases of gross income of $1,690,766. There was an increase of 12,000,000 passengers for 1912, and the company now has under order and construction one hundred new cars to provide for additional traffic. The gross earnings of the Sao Paulo division increased $842,000 during 1913. A total of 104 electric passenger cars was added to the equipment and the tramway lines were extended 15.4 miles. The total passengers carried increased from 48,113,109 in 1912 to 56,776,702 in 1913.

Great Berlin Street Railway

The Grosse Berliner Strassenbahn (Great Berlin Street Railway) report for the calendar year 1913 shows the following comparison with the year 1912, the figures for which are given in parentheses: The number of passengers carried was 466,300,000 (463,300,000) and the gross earnings from passenger business were $11,104,540 ($11,036,730). The mileage was 65,995,687 car miles (64,826,991 car miles), and the earnings per passenger car mile 16.69 cents (16.88 cents). The total gross earnings were $11,443,829 ($11,395,993) and the operating expenses $6,711,134 ($6,457,052). The ratio of operating expenses to gross earnings was 58.64 per cent (56.66 per cent). Salaries and wages totaled $4,057,758 ($3,925,534), and expenses for employees' welfare $260,990 ($235,756).

The company operated 1757 motor cars and 1091 trail cars. As 1396 cars were passed through the shops during the year, it appears that cars are completely overhauled about once every two years. The maintenance of rolling stock cost $896,990 ($878,253); of buildings, $67,630 ($60,605), and of way and line for 592.4 km (367.3 miles), $430,944, as compared with $333,594 in 1912 for 570.5 km (353.7 miles) of track. Accidents, including contingent expenses, cost $215,999 ($218,389). To the renewal funds a total of $625,000 was assigned, of which $137,500 was applied to the car renewal fund. The sum of $816,668 was paid for franchises, taxes, etc. The share of the Berlin Municipality

alone was $158,310. A dividend of 8 per cent was declared on a capital stock of $25,020,600.

The company employed 12,540 people, of whom 9268 were members of the pension society. During the year the pension fund received $135,215 from the members, $159,860 from the company and $116,833 from investments. The sick benefit society comprised practically all of the employees. The average number of persons carried a day was 1,277,534, equivalent to 3449 passengers per mile of track. During the year sixteen persons were killed, 132 badly injured and 919 slightly injured. The company was blameless in the case of five deaths, twenty-four severe injuries and 351 slight injuries.

New York Railways Income Bond Suit

On July 27 the New York Life Insurance Company brought suit against the New York (N. Y.) Railways, charging improper retention of interest on the company's 5 per cent non-cumulative income bonds for the benefit of its stockholders. Beside the New York Railways the following are named in the suit: Farmers Loan & Trust Company; Edward S. Markston, president Farmers Loan & Trust Company; Alexander J. Hemphill, president Guaranty & Trust Company; Guy C. Tripp, chairman board of directors Westinghouse Electric & Manufacturing Company, and Harry Browner, director Equitable Trust Company. The New York Life Insurance Company, together with the co-operating bondholders, represents about $6,500,000 of the $30,626,977 affected by the alleged transaction.

The chief point at issue between the two companies is the treatment of the unexpended reserves for injuries and damages, as noted in the ELECTRIC RAILWAY JOURNAL of May 7. The insurance company does not object to reserves being set up by the railway, but it alleges that 8 per cent was set aside, while in 1911 only 6.45 per cent and in 1912 only 5.95 per cent of the passenger revenue was expended. The insurance company contends that the unexpended amounts should automatically revert to surplus. It demands that the approval of the directors of the statements of semi-annual earnings be set aside and it asks for an accounting of all railway earnings and income during 1912 and 1913. Furthermore, it requests that any money found to be applicable to the payment of interest be placed in the hands of a receiver for disposal by court direction.

Since Jan. 1, 1912, the New York Railways has set up a reserve of 8 per cent of the passenger revenue for injuries and damages, the calendar year 1913 being included. In February, 1914, however, the company after an investigation by outside engineers changed the reserve for 1913 to 7½ per cent at the instigation of the insurance companies, but this move was criticised by the Public Service Commission on account of its retroactive features.

Batavia (N. Y.) Traction Company.—The Batavia Traction Company, which was incorporated in New York March 19 to purchase the Buffalo & Williamsville Railway, as noted in the ELECTRIC RAILWAY JOURNAL of May 9 and June 18, has issued $25,000 in stock in $1 shares and $25,000 (total issue) of first mortgage 5 per cent gold bonds, dated July 1, 1914, and due in 1944, but callable on sixty days' notice at par. Of the bond issue $16,000 has already been subscribed for in Batavia.

Binghamton (N. Y.) Railway.—The Binghamton Railway has announced that no dividend can be declared for two years. The last dividend paid was 2 per cent in February, 1914.

Boston (Mass.) Elevated Railway.—At a meeting of the directors of the Boston Elevated Railway on July 27, the board authorized the payment of a quarterly dividend of $1.50 per share on Aug. 15. This action restores the company to the 6 per cent class, in which it stood from 1902 to 1913, when the stock was put on a 4 per cent basis as a result of losses incurred during the strike of 1912. A 2 per cent dividend was declared in February, 1914. It is stated that the company's earnings increased about $900,000 in the year ended June 30, 1914.

Cape Town (S. A.) Consolidated Tramways & Land Company, Ltd.—According to the report of the Cape Town Consolidated Tramways & Land Company, Ltd., for the year ended Dec. 31, 1913, after payment of administration expenses and interest charges, a balance of £1,797 was shown to the debit of profit and loss. This, added to the balance brought forward from 1912, makes a total debit to profit and loss of £8,103. No dividends were declared by the subsidiary companies during the year. The operation of the Camps Bay Tramways resulted in a profit of £1,599, as compared to a profit of £2,973 the previous year.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—According to a petition presented to the Ohio Public Utilities Commission, unless the commission authorizes the Hocking-Sunday Creek Traction Company to issue $300,000 of twenty-year 6 per cent bonds for the completion of its road and the refunding of present obligations, a receiver must be appointed for the property. This road extends from Nelsonville to Athens, a distance of 14 miles. It is half completed and the finished part has been in operation for almost two years. The remainder of the road is graded and bridges have been constructed.

Jersey Central Traction Company, Keyport, N. J.—The Jersey Central Traction Company has executed a general refunding improvement and extension mortgage for $5,000,000 to the Girard Trust Company, Philadelphia, as trustee. This mortgage secures bonds dated March, 1914, and due 1939, but subject to call March 1, 1917, or on any interest date at 102½. Of the bonds, $1,500,000 is reserved to retire the outstanding $230,000 of first 5's and $1,270,000 of general mortgage bonds. The mortgage provides that the discount on the sale of the bonds be amortized during their life. The authorization of this mortgage was noted in the ELECTRIC RAILWAY JOURNAL of May 23.

Kankakee & Urbana Traction Company, Urbana, Ill.—The Illinois Public Utilities Commission has authorized the Kankakee & Urbana Traction Company to sell $213,000 of preferred capital stock for the purpose of extending its line from Rantoul to Paxton. The company has been operating 15 miles of track from Urbana to Rantoul and has now under construction 5 miles between Rantoul and Ludlow.

Lincoln Railway & Light Company, Lincoln, Ill.—James E. Hoblit, cashier of the Lincoln State Bank, has been appointed receiver of the Lincoln Railway & Light Company. He assumed charge of the line on July 18. The receivership is the result of two suits brought against the company, the first by F. G. Hudson, Charlestown, Ill., and F. M. Maury, Philadelphia, Pa., and the second by T. F. Kuhl, trustee for the company. The suits charged that the company had failed in the payment of interest and principal of its outstanding bonds.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Los Angeles & San Diego Beach Railway has filed an application with the California Railroad Commission asking for authority to issue $825,000 of bonds, secured by a trust deed of all the company's property. The funds are to be used in electrifying certain portions of the company's lines, as previously ordered by the commission in approving those now in existence. The company also proposes to acquire new terminal grounds in San Diego and to erect a terminal building at a cost of $25,000. The company also wishes to purchase sixteen passenger cars and seventeen passenger trailers at a cost of $125,000. The total sum which the company plans to expend is $723,198, divided as follows: plant investment, $371,612; new equipment, $131,000; refunding indebtedness, $180,586, and interest for first year, $40,000.

Massachusetts Northeastern Street Railway, Haverhill, Mass.—The Massachusetts Northeastern Street Railway has petitioned the Public Service Commission of Massachusetts for the approval of an issue of mortgage bonds not exceeding a par value of $1,000,000. These are part of a proposed twenty-year 5 per cent issue of an aggregate face value not to exceed $2,000,000 at any one time outstanding, dated May 1, 1914. The commission on Sept. 13, 1913, approved an issue of mortgage bonds by the company in the amount of $1,000,000, but since that time the stockholders have voted to authorize the bonds to be dated July 1, 1914, instead of Jan. 1, 1914.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—An application was filed with the California Railroad Commission on July 21 by the Oakland, Antioch & Eastern Railway asking authority to issue $900,000 of 6 per cent con-

vertible gold notes to be secured by first mortgage thirty-year gold bonds in the ratio of two to one. The notes are to be convertible before maturity at the holder's option on the basis of 80 per cent of the par value of the bonds and accrued interest for par value of the notes and accrued interest. The notes are also to be redeemable in whole or in part at the option of the company on any interest date at face value and accrued interest on not less than thirty days' notice. The proceeds of the issue are to be used to pay off the floating indebtedness, which on April 30 amounted to $1,349,960, with cash on hand of $44,562 and accounts receivable of $89,144.

Ottawa (Ont.) Electric Railway.—The gross earnings of the Ottawa Electric Railway for the year ended Dec. 31, 1913, were $1,041,282. Operating expenses and maintenance were $629,122, giving net earnings of $412,160, as compared to $400,059 in 1912. The net earnings were disposed of as follows: Four quarterly dividends at 3 per cent and a bonus of 3 per cent, $281,535; interest on bonds and loans, $20,772; mileage payments, $13,737; taxes, $12,-222; credit of contingent account, $55,000, and credit of profit and loss, $28,894. During the year 23,987,883 passengers were carried, as compared to 21,815,798 in 1912, an increase of 2,172,085. The record of the company shows an increase in gross receipts from $71,000 in 1892 to $1,041,282 in 1913.

Philadelphia Company, Pittsburgh, Pa.—The Philadelphia Company, which controls the street railway lines in Pittsburgh and vicinity, recently filed notice of a reduction in capital stock from $73,000,000 to $69,433,400.

Piedmont & Northern Railway, Charlotte, N. C.—The merger of the Piedmont Traction Company, operating 23 miles of electric railway between Charlotte and Gastonia, N. C., and the Greenville, Spartanburg & Anderson Electric Railway, operating 102 miles of electric line between Spartanburg, Greenville, Anderson and Greenwood, S. C., into the Piedmont & Northern Railway, was noted in the ELECTRIC RAILWAY JOURNAL of July 25. It is deemed improbable that any of the securities of the new company will be on the market soon. Both of the merged lines were built by J. D. Duke and associates and to a large extent have been privately financed. The $50,000,000 mortgage which has been executed by the new company is to cover bonds for the purchase of the merged lines, their equipment, real estate and other property and for the construction of additions, extensions, branches and improvements of existing lines. It will require the construction of 50 miles of railroad to connect the north and south divisions. The equipment is all high speed and the company is inaugurating a freight service in conjunction with the steam railroads with which it connects.

Porto Rico Railways, Ltd., Toronto, Ont.—According to the seventh annual report of the Porto Rico Railways, Ltd., which controls the Porto Rico Railway Light & Power Company, San Juan, Porto Rico, the gross earnings for the year ended Dec. 31, 1913, amounted to $850,122, as compared to $828,084 for the previous year, an increase of $22,037. The net income of $447,375 compared with $373,405 was an increase of $73,970. After providing for interest charges and preferred dividends the surplus was $222,156, equal to 7.4 per cent on the common stock. The number of passengers carried during the year was 7,283,479, or an increase of 572,176. The freight hauled amounted to 165,958 tons, an increase of 18,030 tons. There was expended on capital account during the year $483,326. Maintenance expenses amounted to $104,677.

San Joaquin Light & Power Corporation, Bakersfield, Cal.—The California Railroad Commission has authorized the San Joaquin Light & Power Corporation to issue promissory notes in the amount of $249,967 to renew other notes outstanding. Steps are now being taken by this corporation to pay off its floating indebtedness of $1,615,-661 and to provide funds for new construction. The commission has also made an order granting the company additional time in which to issue $1,776,000 of bonds which it proposes to pledge as security for certain two-year 6 per cent collateral trust notes. The authority as now granted will expire Dec. 31, 1914.

Titusville (Pa.) Electric Traction Company.—The receiver of the Titusville Electric Traction Company has been authorized by the court to sell the property at public auction subject to outstanding mortgages and liens. The capitalization of this company, which was chartered in 1897, is reported to be $300,000 of stock and $300,000 of first mortgage 6 per cent gold bonds. The company has 16¾ miles of track connecting Titusville, Pleasantville, and Fieldmore Springs. The results of operation for the year ended June 30, 1913, were as follows: Gross earnings, $37,108; net income, $6,527, and deficit, after interest payment of $6,370 and taxes, $611.

Underground Electric Railways, Ltd., London, England.—The London Stock Exchange recently listed the following additional securities of the London & Suburban Traction Company, Ltd.: 9649 ordinary £1 shares, 16,426 5 per cent cumulative preferred £1 shares, and £4,224 of 4½ per cent first mortgage debenture stock, making the total amounts listed on the exchange £1,842,785, £1,597,485 and £180,976 respectively.

Winnipeg Electric Company, Manitoba, Can.—G. M. Manton, Winnipeg, Man., was on July 24 elected vice-president of the Winnipeg Electric Railway, to succeed the late Sir William Whyte. G. V. Hastings was elected director of the company.

Dividends Declared

Connecticut Railway & Lighting Company, New Haven, Conn., quarterly, 1 per cent, preferred and common.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Illinois Traction Company, Peoria, Ill., quarterly, three-quarters of 1 per cent, common.

Monongahela Valley Traction Company, Fairmont, W. Va., 2½ per cent, preferred.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly 1¼ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '14	$29,864	$24,075	$5,788	$681	$5,107
1 " " '13	34,420	28,109	6,311	642	5,669

BATON ROUGE (LA.) ELECTRIC COMPANY

1m., May, '14	$14,964	*$9,650	$5,314	$2,109	$3,205
1 " " '13	12,231	*7,550	4,681	2,076	2,605
12 " " '14	172,633	*112,603	60,030	25,292	34,738
12 " " '13	150,336	*92,257	58,079	22,163	35,916

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m., May, '14	$10,999	*$9,936	$1,063	$1,083	†$20
1 " " '13	10,279	*8,537	1,742	1,106	636
12 " " '14	122,375	*102,318	20,057	12,899	7,158
12 " " '13	121,768	*94,184	27,584	12,807	14,777

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1m., May, '14	$29,486	*$16,095	$13,391	$6,438	$6,953
1 " " '13	29,989	*19,115	10,874	6,082	4,792
12 " " '14	374,595	*207,657	166,938	74,916	92,022
12 " " '13	372,592	*199,622	172,971	69,932	103,039

COLUMBUS (GA.) ELECTRIC COMPANY

1m., May, '14	$54,087	*$25,476	$28,611	$24,781	$3,831
1 " " '13	55,983	*25,809	30,174	20,350	9,824
12 " " '14	641,478	*280,681	360,797	296,720	64,078
12 " " '13	645,135	*290,522	354,614	233,735	120,879

DALLAS (TEX.) ELECTRIC COMPANY

1m., May, '14	$184,844	*$105,649	$79,196	$27,493	$51,703
1 " " '13	184,737	*108,829	75,908	24,616	51,292
12 " " '14	2,270,244	*1,336,740	933,504	314,939	618,565
12 " " '13	1,982,032	*1,161,467	820,565	295,736	524,829

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

1m., May, '14	$55,084	*$32,836	$22,248	$8,377	$13,871
12 " " '14	596,137	*362,682	233,455	94,679	138,776

EL PASO (TEX.) ELECTRIC COMPANY

1m., May, '14	$83,286	*$47,521	$35,764	$4,200	$31,564
1 " " '13	71,023	*39,330	31,693	4,184	27,509
12 " " '14	956,602	*521,694	434,907	51,285	383,622
12 " " '13	855,963	*460,169	395,794	53,831	341,963

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., May, '14	$210,528	*$112,367	$98,162	$35,669	$62,493
1 " " '13	202,470	*111,516	90,954	34,755	56,199
12 " " '14	2,442,274	*1,376,513	1,065,761	433,156	632,605
12 " " '13	2,180,999	*1,256,545	924,453	409,692	514,761

*Includes taxes.
†Deficit.

Traffic and Transportation

Accidents on Interstate Railways

The Interstate Commerce Commission, Washington, D. C., has issued a summary for the three months ended Dec. 31, 1913, of the casualties to persons on railways under its jurisdiction.

The total number of casualties of all classes reported to the commission amounted to 2792 for persons killed and 50,776 for persons injured. This statement includes 85 passengers killed and 4136 passengers injured and 826 employees killed and 14,576 employees injured. The casualties were sustained by employees while at work, by passengers getting on or off cars, by persons at highway crossings. by persons doing business at stations, etc., as well as by trespassers and others. In addition 117 persons were killed and 29,007 persons injured in "industrial accidents," which term covers accidents not involved in train operation but occurring to railway employees, other than trainmen, on railway premises. The report for interstate electric railways in particular shows that the list of those killed during the three months was 124, or 4.44 per cent of the total, and the list of injured 1445, or 2.84 per cent.

From the statement of the commission for electric railways, which is appended, the columns have been eliminated which show casualties to employees not on duty and to trespassers. Two of the former class were killed and six injured, while of trespassers thirty-nine were killed and thirty-seven injured. The summary as given by the commission, with the eliminations noted above, is reproduced as follows:

Causes	Number of Accidents	Passengers Killed	Passengers Injured	Employees on Duty Killed	Employees on Duty Injured	Other Persons Not Trespassing Killed	Other Persons Not Trespassing Injured	Total Persons Killed	Total Persons Injured
Collisions	57	2	170	3	30	...	...	5	203
Derailments	15	1	27	1	4	...	...	2	31
Accidents to trains, cars, or engines, except collisions derailments and boiler explosions	1	...	...	..	...	...	...	...	....
Bursting of, or defects in, locomotive boilers, or boiler attachments	...	...	...	..	...	...	...	...	....
Total train accidents.	73	3	197	4	34	...	...	7	234
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	...	...	...	..	...	...	...	...	....
Coupling or uncoupling cars (exclusive of accidents with air or steam-hose)	***	...	...	..	9	...	...	...	9
While doing other work about trains (not in shops or enginehouses) or while attending switches	***	...	...	2	51	...	...	2	51
Coming in contact while riding on cars with overhead bridges, tunnels, or any signal apparatus, or fixed structure above or at side of track	***	...	2	..	9	...	...	...	11
Falling from cars or engines	***	1	26	2	8	...	1	3	37
Getting on or off cars or engines	***	5	347	..	23	...	1	6	375
Other accidents on or around trains not here named	***	...	107	..	6	1	12	1	125
Being struck or run over by engines or cars at stations or yards	***	...	...	1	2	3	9	5	13
Being struck or run over by engines or cars at highway grade crossings	***	...	...	..	...	29	182	32	187
Being struck or run over by engines or cars at other places	***	...	4	1	1	16	87	52	114
Other causes	***	...	26	..	...	2	10	3	41
Total other than train accidents	***	6	512	6	109	51	302	104	963
Grand total, exclusive of industrial accidents	***	9	709	10	143	51	302	111	1,197
Industrial accidents to employees	***	***	***	13	248	***	***	13	248
Grand total	***	9	709	23	391	51	302	124	1,445

NOTE: *** means not totalized.

The bulletin of the commission also contains the following statement of the collisions and the derailments on electric railways during October, November and December, 1913:

Classes	Number	Damage to Road and Equipment and Cost of Clearing Wrecks	Number of Persons Killed	Number of Persons Injured
Collisions:				
Rear	24	$6,024	2	115
Butting	14	10,173	3	40
Train separating	..	.....	..	...
Miscellaneous	19	8,864	..	48
Total	57	25,061	5	203
Derailments due to—				
Defects of roadway	1	25	..	1
Defects of equipment	3	1,650	..	1
Negligence of trainmen, signalmen, etc.	2	115	..	2
Unforeseen obstruction of track, etc.	2	2,200	1	...
Malicious obstruction of track, etc.	1	250	..	1
Miscellaneous causes	6	5,400	1	26
Total	15	9,640	2	31
Total collisions and derailments.	72	34,701	7	234
Total for same quarter of—				
1912	79	37,513	7	415
1911	65	33,395	10	376
1910	67	49,677	41	455

Puget Sound Electric Railway Fare Case Reviewed

The history of the Puget Sound Electric Railway fare case concerning rates between Seattle and Tacoma, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL, is reviewed as follows in an editorial "Liberty" in the July *Public Service Journal* published by Stone & Webster, managers of the railway:

"The Public Service Commission of the State of Washington not long ago abolished an order of the old Railroad Commission which was put in force in 1910, the only effect of which was a waste of energy and accomplishment. In 1910 the Railroad Commission of Washington ordered a reduction in the passenger rates of the Puget Sound Electric Railway, which had been previously fixed by the company at 2 cents a mile, with commutation rates to regular riders of 1.4 cents a mile. At the same time it announced that the corporation was entitled to earnings of 7 per cent on the investment, after operating expenses, taxes and depreciation had been provided for. The commission estimated that under the tariff ordered this result would be accomplished. For seven years up to and including 1908, the fares of this road had been fixed at considerably less than 2 cents a mile, which was too low for the service furnished, but it was hoped that the general and traffic conditions would enable it to maintain these rates. On account, however, of financial losses it was found necessary to advance the rates to approximately 2 cents, with a commutation rate, as we have stated, of 1.4 cents. Compared with steam railroad rates and with interurban rates in Washington and throughout the country, it was felt by the Puget Sound Railway that its rates were not at all excessive. Complaint, however, was made to the Railroad Commission of the State of Washington, which placed a cash value on the company's property of $4,070,237 and forced the company to lower its rates to figures which it believed would admit of a return of 7 per cent on this amount.

"The matter was carried to the courts, but eventually, on Oct. 14, 1911, the order was put in force in order that the rates of the commission might be tested to ascertain if the commission's estimate was correct. After this tariff had been in force for approximately two years, it was found that the rates, instead of yielding a net return of $289,179 (7 per cent on the commission's valuation) for the year 1912, yielded only $89,655, with no provision made for accrued depreciation. In other words, instead of yielding 7 per cent the rates had yielded only 2.2 per cent. The showing for the year 1913 was even worse, the net return being only $67,718, or 1.66 per cent, instead of 7 per cent as estimated by the commission on the actual money invested by the company.

"Since this order was forced upon the company, the

Railroad Commission has been superseded by the Public Service Commission in the State of Washington. In view of the facts just stated, it will easily be seen that it was necessary for the Puget Sound Company to seek relief in order that the property might be maintained and that a fair return might be given the owners on their investment. Consequently an application was made to the Public Service Commission, asking that the order of the Railroad Commission be set aside and the company be allowed to operate under a new tariff. The hearing on this application began on April 15, and on May 13 the Public Service Commission abolished the order of the old Railroad Commission which was put in force in 1910."

Near-Side Stop in Operation in Indianapolis.—The Indianapolis (Ind.) Street Railway has begun to stop its cars on the near side of the street, in compliance with a new traffic ordinance recently drafted by the City Council.

Near-Side Stop for Pine Bluff.—An ordinance was recently passed by the Council at Pine Bluff, Ark., requiring the cars of the Pine Bluff Company to stop on the near side of the street and to discharge passengers from the front end of the car.

Pole Signs for Information of Patrons.—The Galesburg & Kewanee Electric Railway, Kewanee, Ill., has installed signs on all poles along its route where cars are supposed to stop, to inform its patrons as to just what time the cars are due to pass.

Increase in Fare Authorized in West Virginia.—The Public Service Commission of West Virginia on July 23 sustained the appeal of the Parkersburg-Marietta Interurban Railway, Parkersburg, W. Va., to increase its rates between Parkersburg and Marietta by way of Williamston from 10 cents to 20 cents by creating four traffic zones. The company is required, however, to issue commutation tickets that will be equivalent to a 5-cent fare for 6½ miles from Parkersburg.

Montpelier Fare Increase Case Postponed.—The Barre & Montpelier Traction & Power Company, Montpelier, Vt., and the city of Montpelier have reached an agreement to the effect that there will be no increase in fares pending continuation of hearings on Aug. 21 in the equity suit brought by the city to determine the legal right of the company under its franchise to charge a greater fare than 5 cents. The counsel of the railway asked for a continuation in order to have more time for the preparation of the company's case.

Pay-As-You-Enter Plan for Covington.—An ordinance providing for the installation of pay-as-you-enter devices and collapsible seats for conductors on all cars of the South Covington & Cincinnati Street Railway, Covington, Ky., was recently introduced by Mayor Phillips at a meeting of the city commissioners. The ordinance provides that these devices must be installed upon one-third of the cars within three months and upon all of the equipment within nine months. The matter has been referred to the committee of the whole.

Reduction of Fares for Holden.—The Massachusetts Public Service Commission has ordered the Worcester (Mass.) Consolidated Street Railway to reduce its fares between Holden and Worcester from 15 cents to 10 cents. The decree orders that the railway shall furnish special tickets at the rate of 10 cents each, good between 5.40 a. m. and 7.40 a. m. and between 4.55 p. m. and 6.55 p. m. for the use of its regular patrons traveling between any part of Holden and Worcester city hall. The distance between Holden and Worcester is 9 miles.

Springfield Traction Company Increases Wages.—The Springfield (Mo.) Traction Company on July 21 announced a voluntary increase in wages amounting to 1½ cents an hour for both conductors and motormen. About 100 employees will be benefited by the increase, which will add $5,000 annually to the payroll. Motormen and conductors who have been employed less than one year will receive the minimum scale of 17½ cents; more than one year and less than two years, 19 cents; more than two years and less than three years, 20 cents, and three years, 21 cents. Those who have been with the company five years or longer will get the maximum, 22½ cents an hour. About 50 per cent of the men affected by the increase are in this group.

Armed Guards Proposed for Suburban Cars.—As a result of a recent car hold-up in Los Angeles in which a conductor was fatally injured, a meeting of all the peace officers of the city and county and the heads of both the Los Angeles Railway and the Pacific Electric Railway has been called to devise ways of protection for car crews. It is expected that special armed deputies will be placed on all cars going to the outskirts of the city and that men will be posted at all line terminals.

"Safety First" Campaign in Louisville.—The cars of the Louisville (Ky.) Railway on both city and interurban lines are carrying large black and white placards announcing that "safety first" is the slogan of the league of employees of the company, the formation of which was noted in the ELECTRIC RAILWAY JOURNAL of June 27. In most cases the cards are hung at the front end of the cars, over the upper part of the front windows. The Louisville papers have called attention to the appearance of the placards and have commented favorably upon the objects of the movement.

Fatal Trolley Crash at Westport.—Three persons were killed outright, another died later and forty were injured as the result of a head-on collision at Westport, Conn., on July 22 between a three-car electric train carrying Sunday school picnickers and a trolley express car on the Norwalk division of the Connecticut Company. It is alleged that the motorman in charge of the train was running at high speed in order to reach a siding ahead of the express car, which was approaching on the same stretch of single track. C. H. Chapman, superintendent of the Bridgeport division, states that it is apparent one of the motormen ran by his signal, and the investigation will disclose the one at fault.

Guard on Rear Platform of Elevated Trains.—As a result of complaints made to the Public Service Commission for the First District of New York in regard to rowdyism on the back platforms of the rear cars of elevated trains in Brooklyn, the commission has served an order on the New York Consolidated Railroad, the Nassau Electric Railroad and the South Brooklyn Railway, the operators of the elevated lines, directing them to provide and maintain an employee during the morning and evening rush hours on the rear platform of all such trains. This employee shall control the conduct of passengers, to the end that the safety and convenience of other passengers shall be guarded from boisterous or improper conduct. The order is to go into effect immediately.

Springfield Company Petitions for New Rate Hearing.—The Springfield Gas & Electric Company, Springfield, Mo., on July 25 filed a motion for a new hearing of its rate case by the State Public Utilities Commission. The order of the commission reducing the company's rates 7 per cent, and fixing 7 per cent as a fair return on the investment, as noted in the ELECTRIC RAILWAY JOURNAL of July 11, is characterized by the company in its motion as unfair, unjust and unreasonable. The petition alleges that the commission is an administrative body solely, and when passing on questions of a judicial nature is violating the Constitutions of Missouri and of the United States. The brief that was presented by the company in the original hearing was abstracted in the ELECTRIC RAILWAY JOURNAL of May 20.

Massachusetts Commission Orders Reduction in Height of Steps.—Upon the petition of the Worcester board of aldermen, the Hyde Park Current Events Club and other organizations, the Massachusetts Public Service Commission has issued an order providing that all electric cars hereafter purchased and operated in the State must be equipped with steps not exceeding 15 in. in height, the first step being measured from the top of the rail. The order also requires that all cars now operated by electric railways in the State shall be so altered so that by July 1, 1915, no bottom step shall be more than 17 in. above the rail. The commission reserves the right, however, to extend this time limit for financial or other satisfactory cause. Another section of the order stipulates that electric railways, before purchasing new cars or making changes in present equipment, shall submit to the board for its approval drawings in sufficient detail to show the type of cars to be purchased or the changes contemplated.

Personal Mention

Mr. Sidney Ossoski has severed his connection as general claim agent of the Chicago (Ill.) Railways.

Mr. R. S. Rowley has been appointed general claim agent of the Chicago (Ill.) Railways in place of Mr. Sidney Ossoski.

Mr. A. E. Dedrick has been appointed secretary and auditor of the Newcastle & Lowell Railway, New Castle, Pa., to succeed Mr. E. D. Gaul.

Mr. William Dods has been appointed vice-president of the Carbon Transit Company, Mauch Chunk, Pa., to succeed Mr. C. H. Latta.

Mr. E. T. Chapman has been appointed assistant treasurer of the Connecticut Company, New Haven, Conn., to succeed Mr. T. F. Paradise.

Mr. Peter M. Miller has been appointed assistant treasurer of the Jacksonville (Fla.) Traction Company, to succeed Mr. Arthur F. Butler.

Mr. H. E. Harley has been appointed chief engineer of the power station of the Jacksonville (Fla.) Traction Company, to succeed Mr. F. D. Barry.

Mr. Charles N. Hebner has resigned his position as secretary of the Illinois Public Utilities Commission, the resignation taking effect on July 24.

Mr. R. A. Anderson has been appointed chief engineer of the power station of the Portsmouth (N. H.) Electric Railway, to succeed Mr. John Kirk.

Mr. J. D. Kline has been appointed superintendent and purchasing agent of the Montgomery (Pa.) Transit Company, to succeed Mr. E. W. Goss.

Mr. A. M. Nanton, Winnipeg, Man., Can., was on July 24 elected vice-president of the Winnipeg Electric Railway, to succeed the late Sir William Whyte.

Dr. Robert Pattai has been elected president of the Austrian Association of Local & Light Railways. This association now numbers fifty-four electric and forty-three steam railways with a total length of 1503 miles.

Mr. William B. McKinley, president of the Illinois Traction System, addressed the Jefferson City (Mo.) Commercial Club on July 23. Mr. McKinley asserted that Missouri's drastic corporation laws have retarded the development of the State more than any other factor. He referred particularly to the measure providing that a foreign corporation cannot hold more than 10 per cent of the stock of a domestic company.

Mr. T. R. Veach has been appointed auditor of the San Francisco, Napa & Calistoga Railway, Napa, Cal., to succeed Mr. George Maxwell. Mr. Veach was formerly employed with the Central California Traction Company, San Francisco, Cal., and the Reno (Nev.) Traction Company for about two years as assistant auditor. Prior to this time he was with the Great Western Power Company as bookkeeper, cashier and traveling auditor for a period of about five years.

Mr. T. H. Blaikie has been appointed auditor of the Albany (N. Y.) Southern Railroad, to succeed Mr. A. L. Linn, resigned. From April, 1904, to December 31, 1911, Mr. Blaikie was head bookkeeper and chief clerk of the Consolidated Railway Company and the Connecticut Company at New Haven, Conn. When the United Electric Light & Water Company began operations Jan. 1, 1912, at Waterbury, Conn., he was offered the position of chief accountant, which he filled until May 15, 1914.

Mr. J. B. Rannie, who has been connected with the British Columbia Electric Railway, Ltd., Vancouver, B. C., for nearly twenty-five years, has severed his connection with the company. Mr. Rannie's career with the company dates from September, 1889. After serving as conductor and motorman for a number of years in Vancouver city service, he was appointed traffic superintendent of the Vancouver lines in 1900. In 1911 he was appointed traffic agent, a position which he occupied up to the date of his resignation. Mr. Rannie has purchased a small ranch near Chilliwack, B. C., where he will engage in agricultural pursuits.

Mr. J. T. Huey has been appointed superintendent of the railway department of the Birmingham Railway, Light & Power Company, Birmingham, Ala., to succeed Mr. Geo. H. Harris, resigned. Mr. Huey's entire railway experience has been confined to the Birmingham Railway, Light & Power Company and its predecessors. He has been in the service of these companies for the last twenty years, during which time he worked in practically all departments. Prior to his promotion to the position of superintendent of the railway department, he was assistant superintendent of this department under Mr. Harris.

Mr. C. F. Hewitt has been appointed assistant general manager of the United Traction Company, Albany, N. Y. He resigned some time ago as vice-president and general manager of the Des Moines (Ia.) City Railway and vice-president and general manager of the Inter-Urban Railway, Des Moines. Mr. Hewitt, as noted in the ELECTRIC RAILWAY JOURNAL of May 18, 1912, has been connected with the Elmira Water, Light & Railroad Company, Elmira, N. Y., as superintendent; with the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., as general superintendent, and with the East St. Louis & Suburban Railway, East St. Louis, Ill., as general superintendent.

Mr. David W. Houston, whose appointment as superintendent of the Regina (Sask.) Municipal Railway was noted in the ELECTRIC RAILWAY JOURNAL of June 20, was born in Bathurst, N. B., Jan. 3, 1879. He entered transportation service in July, 1899, and until 1902 was clerk with the Chicago, Burlington & Quincy Railroad, Omaha, Neb. From 1902 to 1907 he studied at the School of Mining, Queen's University, Kingston, Ont., being graduated therefrom with the degree of B.Sc. From May to October, 1907, Mr. Houston was inspector of mining claims, Ontario Government, Montreal River District. In 1908 he became auditor and acting manager of the Tabor & Northern Railway, Tabor, Ia., which position he left in July, 1913, to become assistant superintendent of the Regina Municipal Railway. From March 12, 1914, Mr. Houston was acting superintendent of this line.

Mr. C. S. Banghart, superintendent and master mechanic of the New York & Queens County Railway, Long Island City, N. Y., has been appointed general manager of the Binghamton (N. Y.) Railway. Mr. Banghart has been superintendent of the New York & Queens County Railway since October, 1908, at which time he had been master mechanic of the company for five years. His first railway position was with the line department of the Allentown & Bethlehem Traction Company, after which he was engaged in the electrification of the Union Railway, New York, for the Thomson-Houston Company. Later he joined the M. A. Greene Engineering Company, Allentown, Pa. In 1895 he became master mechanic of the Union Traction Company, Reading, Pa., which position he filled until his connection with the New York & Queens County Railway. Mr. Banghart will take up his duties at Binghamton on Sept. 1.

OBITUARY

William E. Clark, representative of the Rail Joint Company, New York, N. Y., died July 5. Mr. Clark was born in Manchester, Mass., Nov. 5, 1847. After service in the Civil War he engaged in railroad bridge building. Later he served as roadmaster for the Connecticut division of the Boston & Maine Railroad for nearly twenty-five years. About 1897 he accepted the position with the Rail Joint Company.

James W. Benham, secretary and treasurer of the Naugle Pole & Tie Company and president of the Northern White Cedar Association, was killed on July 27 in an automobile accident. Mr. Benham was born in Minneapolis, Minn., in 1866 and received his early education in San Francisco, Cal. While still a youth he went into Arizona and became identified with the cattle industry. He became a Legislator, a member of the first livestock sanitary board and a member of the first forestry organization of Arizona Territory. In 1901 Mr. Benham went into business in New York City. He moved to Chicago in 1906 and became a member of the Naugle Pole & Tie Company, then a partnership. When it was incorporated in 1910 he was made secretary and treasurer.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Alton & Jacksonville Railway, Alton, Ill.**—Incorporated in Illinois to build an electric railway between Alton and Jacksonville. The incorporators and first board of directors are: Frank L. Butler, Wade T. Meloan, James S. McClellan, Harry Okin, Louis W. McIntyre, Berthold P. Bergold and Jerome J. Cermak.

Pekin (Ill.) Street Railway.—Application for a charter has been made by this company to take over the present railway system in Pekin, and it is the intention, if the City of Pekin does not favor municipal ownership, to improve the line and extend it to the Mineral Springs Park. The company has made an offer to sell to the city, but will apply for a franchise if municipal ownership is voted down. Capital stock, $15,000. Incorporators: W. E. Lautz, D. D. Velde and W. P. Herget.

***Richmond-Hamilton Traction Company, Richmond, Ind.**—Application for a charter has been made by this company in Indiana to build an electric railway from Hamilton, Ohio, to Richmond, Ind. Partial surveys have already been made. Capital stock, $10,000. Directors: Eugene Purtelle, E. Leslie Cole and F. C. Gillen.

***San Marcos Interurban Railway, San Marcos, Tex.**—Incorporated in Texas to build an electric railway in San Marcos. Capital stock, $2,000. Incorporators: G. J. Merritt, Justin Merritt and Thomas Merritt.

Detroit, Pontiac & Owosso Railway, Owosso, Mich.—Incorporated in Michigan to build an electric railway to connect Pontiac, Owosso, Clarkston, Detroit and Fenton. Capital stock, $50,000. Oliver Lau, Detroit, is interested. [E. R. J., March 14, '14.]

***Dodge County Electric Railway, Madison, Wis.**—Chartered in Wisconsin to build an electric railway to connect Mayville, Horicon, Juneau, Beaver Dam and Columbus. Capital stock, $25,000. Incorporators: Charles R. Roberts, I. B. Luther and Charles D. Smith.

FRANCHISES

Victoria, B. C.—The British Columbia Electric Railway has asked the Council for a franchise to double-track its line on Esquimalt Road between Dundas Street and Catherine Street in Victoria. The company plans to build a double track on the entire line from Point Ellice bridge to the terminal.

Healdsburg, Cal.—The Board of Supervisors will open bids on Sept. 10 for the sale of the franchise of the proposed electric line which extends from Healdsburg to Alexander and Dry Creek Valley. A. D. Bowen and associates plan to extend this line from Dry Creek to Cloverdale. [E. R. J., July 25, '14.]

San José, Cal.—The San José Railway has asked the Council for a forty-two-year franchise in San José for a line from East San José to Kirk Avenue in San José.

Miami, Fla.—The Miami Traction Company has received a franchise from the Council to build a 2½-mile electric railway in Miami. B. B. Tatum is interested. [E. R. J., June 13, '14.]

Peoria, Ill.—The Peoria Railway has received a franchise from the Council to double-track its line on Main Street from Elizabeth to Western Avenues in Peoria.

Lafayette, Ind.—The Lafayette & Northwestern Railroad has asked the Board of Supervisors for a franchise in White County to build an electric railway through Round Grove, Princeton and West Point. This line will connect Lafayette and Chicago via Rensselaer, Hammond, Princeton, Round Grove and West Point. [E. R. J., July 25, '14.]

Lafayette, Ind.—The Indiana & Northwestern Traction Company will ask the Board of Supervisors for a franchise through White County.

Hopkinsville, Ky.—On August 22 a twenty-year franchise, providing for an electric railway and giving the right to sell current for light and power, will be offered for sale to the highest bidder. This step was taken at the request of R. E. Cooper, who represents Eastern interests. Recently an interurban franchise was ordered sold in the same way by the local court. It is said that there are ample means to back the proposition and it is believed by some that this is part of an interurban traction plan, probably in connection with one of the companies already interested in this section of the country.

Alexandria, La.—The Southern Traction & Power Company has asked the Council for two franchises to extend its lines on Sixteenth Street to the city limits and on Thirteenth Street to Marye Street in Alexandria.

Shreveport, La.—The Shreveport Traction Company has bought two electric railway franchises from the Council in Shreveport, one to extend the present Fairfield line and the other to extend the franchise for the existing track in Shreveport.

Augusta, Maine.—The Lewiston, Augusta & Waterville Street Railway has received a franchise from the Council to extend and improve some of its lines in Augusta.

Bangor, Maine.—The Bangor Railway & Electric Company has asked the Council for a franchise to double-track its line on Central Street and through Post-office Square in Bangor.

Revere, Mass.—The Bay State Street Railway has asked the Council for a franchise for an alteration and relocation of its tracks on Beach Street and Central Avenue in Revere.

Westfield, Mass.—The Springfield Street Railway has asked the Council for a new location of tracks on the Springfield highway from the West Springfield town line to a point east of Frog Hole.

Elizabeth City, N. C.—T. J. Markham and associates have received a franchise from the Board of Aldermen to build an electric railway in Elizabeth City. This is part of a plan to build an electric line to connect Weeksville, Nixontown, Elizabeth City, South Mills, Deep Creek and Norfolk. [E. R. J., June 6, '14.]

Raritan, N. J.—The application of the Jersey Central Traction Company for approval of an ordinance of Raritan Township, Monmouth County, giving permission to the company to operate an electric railway in Raritan, has been granted by the Board of Public Utility Commissioners.

Buffalo, N. Y.—The Buffalo & Lake Erie Traction Company has received a franchise from the Council for new track in State Street from Twelfth Street to Turnpike in Buffalo.

Jefferson, Ohio.—The Chardon, Jefferson & Meadville Interurban Railway has received a franchise from the Council in Jefferson. This 30-mile line will connect Chardon, Hampton, Fontville, Rock Creek and Jefferson, Ohio, and Linesville, Pa. [E. R. J., June 20, '14.]

Portland, Ore.—The Portland & Oregon City Railway has asked the Council for a franchise from Oregon City to Portland via the East Side.

Harrisburg, Pa.—The Harrisburg & Mechanicsburg Electric Railway has received the approval of the Public Service Commission for an extension of its route in Harrisburg. The company will now ask the Council for a franchise to build the line.

Nashville, Tenn.—The Nashville Traction Company has asked the Council for a franchise along the Murfreesboro pike in Nashville. [E. R. J., July 18, '14.]

Temple, Tex.—The Southwestern Traction Company has received a franchise from the Council to extend several of its lines in Temple.

TRACK AND ROADWAY

Fresno (Cal.) Interurban Railway.—The Railroad Commission has rendered a decision granting this company until Oct. 1 to secure a franchise through Clovis. The securing of this franchise was one of the conditions of the Commission's recent order authorizing the railway company to issue $120,000 of bonds and 600 shares of stock.

Montecito Railroad, Los Angeles, Cal.—Application has been made by this company to the Railroad Commission asking authority to issue and sell 50,000 shares of its authorized capital stock at the rate of 90 cents a share. The company proposes to construct an electric railway from the north end of Griffin Avenue, Los Angeles, to the summit of Montecito Hill, a distance of 2¼ miles. The company also plans to acquire certain property at the upper terminus of the line to be used as an amusement park. [E. R. J., July 25, '14.]

Pacific Electric Railway, Los Angeles, Cal.—Plans have been completed and work will be begun at once by this company on the extension of its elevated railway from the company's Sixth Street station to San Pedro Street, via Maple Avenue in Los Angeles.

***Bay Shore Railroad, San Diego, Cal.**—This company has applied to the Railroad Commission for a certificate of public convenience and necessity authorizing it to construct an electric railway from the intersection of Voltaire Street and Bacon Street, San Diego, northeasterly across the entrance of False Bay to Pacific Beach. The authorized capital stock of the company is $200,000, of which $7,000 has been subscribed. Upon being granted the necessary franchises and permits, the company proposes to apply to the Railroad Commission for authority to issue sufficient capital stock to finance the project.

***Jesup, Ga.**—A stock company that will be capitalized at $10,000 is being organized at Jesup to build an electric line between Jesup and Doctortown. M. Arlino, Jesup, is among those interested.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company will build an extension of its lines to the new shops of the Illinois Central Railway located 2 miles north of Champaign. It is reported that this company will build a loop through a new residence district of Urbana adjacent to the University of Illinois.

Kankakee & Urbana Traction Company, Urbana, Ill.—The Public Service Commission has authorized this company to sell $213,000 of preferred capital stock for the purpose of extending its line from Rantoul to Paxton.

Evansville & New Harmony Traction Company, Evansville, Ind.—Bonds to cover the cost of construction of this line will be first offered for sale in Cynthiana, Ind., one of the cities along the proposed route. After Cynthiana, other towns lying between New Harmony and Evansville will be visited by the promoters of the company, and those which offer the best support will be included on the routing of the new line. [E. R. J., July 25, '14.]

Public Utilities Company, Evansville, Ind.—Residents of the West Side have prepared a petition asking this company to extend its line on Franklin Street from Fulton Avenue to Mary Street in Evansville. This would give a direct route between the North and West Sides. A committee from the North Side Business Men's Association has been appointed to work in favor of the extension.

Interstate Bridge & Terminal Company, Muscatine, Ia.—Plans are being considered by this company to build an electric railway between Muscatine and Galesburg, Ill., and a bridge across the Mississippi River.

Southern Traction Company, Bowling Green, Ky.—This company, which recently purchased the Bowling Green Street Railway Company's property, has begun extension of its lines and has placed a large order for new rails. The first extension will apply to the Broadway line. Rather extensive improvements are being made by the new owner of the property.

***Thibodaux, La.**—Plans are being considered to build a 40-mile electric railway between Lockport, Thibodaux and Donaldsonville. Right-of-way has been obtained between Lockport and Thibodaux. Among those interested are: L. P. Caillouet, H. S. Smith and Alfred Picot, Thibodaux, and Walter Ohimeyer, Plattenville.

Hagerstown & Frederick Railway, Frederick, Md.—The interests which control this company have recently purchased the Frostburg Illuminating & Manufacturing Company, which is the first step toward the building of an interurban electric railway to connect Johnstown, Frostburg, Cumberland and Hagerstown. Surveys have been made for an extension to Hancock.

Grosse Isle Railway, Detroit, Mich.—This company, which plans to build a 10-mile electric line around Grosse Isle, has completed a new bridge below Wyandotte at a cost of $250,000. It has not yet been decided when construction of this line will be begun. E. W. Voigt, Butler Building, Detroit, president. [E. R. J., Nov. 4, '11.]

Detroit, Pontiac & Owosso Railway, Owosso, Mich.—The State Railroad Commission has authorized this company to issue $3,000,000 in bonds. The company was recently incorporated to build an electric railway from Owosso to Detroit. This company will obtain the power to operate its proposed line from the Independent Power Company, Fenton. [E. R. J., March 14, '14.]

Columbia (Mo.) Railway.—Preliminary arrangements are being made by this company to build an electric railway to connect Jefferson City, Mexico, Fulton, Montgomery City, Columbia, Fayette and Glasgow. W. J. Delaney, St. Louis, is interested. [E. R. J., July 18, '14.]

Dover, Somersworth & Rochester Street Railway, Dover, N. H.—Plans are being considered by this company for an extension from Dover to Portsmouth via the New Hampshire side of the river.

Hiawassee Valley Railway, Andrews, N. C.—Preliminary arrangements are being made by this company to begin work within the next few weeks on the 35-mile line from Andrews to Hiawassee, Ga., via Hayesville, N. C. J. Q. Barker, Andrews, N. C., is interested. [E. R. J., Feb. 28, '14.]

New Bern-Ghent Street Railway, New Bern, N. C.—An extension several miles beyond New Bern is being considered.

Williston & Northern Electric Railway, Williston, N. D.—Surveys have been completed and contracts will soon be awarded by this company to build its 60-mile line from Williston north along the west side of Little Muddy Valley. A. H. Brown, president. [E. R. J., June 6, '14.]

East Liverpool Traction & Light Company, East Liverpool, Ohio.—Plans are being made to extend the Pleasant Heights line about 1½ miles in East Liverpool.

Dayton (Ohio) Street Railway.—Plans are being made by this company soon to build an extension from Philadelphia Drive to Fort McKinley in Dayton.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—Application has been made to the Public Utilities Commission by this company for permission to issue $300,000 of bonds to run twenty years and draw 6 per cent interest. It is stated that of the 14 miles of proposed track between Nelsonville and Athens, about half has been completed and that the returns from operation over this portion will not pay the interest charges. The company proposes to use the money secured by the bond issue to complete the line and refund present obligations.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—The Windsor City Council has asked this company to remove its tracks on Howard Avenue, from the side to the center of the road. The city has let a contract for paving the avenue, and the proposal is that the tracks will be moved while this work is in progress.

Pease River Tramway & Navigation Company, Ottawa, Ont.—Adequate financial arrangements have been made by this company to build an electric railway from Smith's Landing, on Pease River, to Port Smith, on the northern boundary of Alberta, and a line from Vermilion Rapids easterly along the northern bank of the Pease River to Vermilion Falls, with branch lines. D. A. Thomas is interested. [E. R. J., Jan. 24, '14.]

Rainy River Radial Railway, Ottawa, Ont.—The Dominion Parliament has granted an extension of time to this company in which to begin the construction of its projected railway in the Rainy River district.

Pacific Power & Light Company, Astoria, Ore.—This company has a portion of the grade stakes set for the extension of the railway to Taylor's Addition, but the work has not been completed. Nothing can be done at present on

the extension of the line to Alderbrook, until the city shall have completed certain street improvements in Uppertown. The extension to Taylor's Addition will be rushed as rapidly as possible.

*Roseburg, Ore.—Plans are being considered to build an electric railway between Roseburg and Marshfield.

Hershey (Pa.) Transit Company.—Contracts have been awarded by this company, for a 10-mile line between Hershey and Elizabethtown, to the King, Evans, Riley Company, Pottsville, Pa. This extension will be known as the Elizabethtown & Deodate Railway.

Northwestern Railways, Meadville, Pa.—This company has awarded a contract to the Erie Steel & Construction Company for the relaying of tracks from Cambridge Springs to Meadville. Work will be begun at once.

Reading, Birdsboro & Pottstown Railway, Reading, Pa.—Surveys have been completed and work will soon be begun by this company on the 18-mile electric railway to connect Reading, Millmont, Flying Hill, Gibraltar, Birdsboro, Baumstown, Weavertown, Amityville and Stowe, where it will connect with the line of the Pottstown Traction Company. The route as surveyed goes through private right-of-way for its entire distance. This is part of the project which contemplates the construction of a bridge across the Schuylkill River at the foot of Sixth Street, Reading, the company taking advantage of a charter granted a dozen years ago. Abbott Witman, general manager.

Wilkes-Barre (Pa.) Railway.—Work will be begun at once by this company on the extension of its Avoca line from the present terminus at the boundary between West Avoca and Duryea to the Lehigh Valley Railroad cut-off tracks. This will bring the line within a short distance of Main Street, Avoca.

Glengarry & Stormont Railway, Montreal, Que.—This company, which plans to build a 27-mile line between St. Polycarpe and Cornwall, Ont., will operate the railway by steam and not by electricity. G. W. Farrell, Montreal, Que., president.

Three Rivers (Que.) Tramway.—Interest has been revived in the construction of an electric railway in Three Rivers. James Bennett, Three Rivers, is interested. [E. R. J., Oct. 12, '12.]

Nashville Railway & Light Company, Nashville, Tenn.—This company has decided to extend its Fatherland Street line to the entrance of Shelby Park in Nashville.

Dallas (Tex.) Consolidated Electric Railway.—As soon as the material ordered arrives this company will begin work double-tracking its line from Main Street and Lamar Street to Elm Street in Dallas.

Southern Traction Company, Dallas, Tex.—During the fall of 1914 this company will build the connecting line between the Corsicana and Waco division. It will connect Waxahachie and Ferris, a distance of 15 miles.

Houston (Tex.) Electric Railway.—This company is asked to consider plans to double track its line on Fannin Street, and Travis Street from Franklin to Dallas Avenue and to route all of its lines over that loop, which will embrace all of the business district in Houston.

Southwestern Traction Company, Temple, Tex.—Plans are being made by this company to begin work on several extensions within the next few weeks in local territory now unprovided with transportation facilities. The first extension will be to the hospital on Bentley Hill, and material for same has been ordered. Among other improvements contemplated is a thirty-minute service on the interurban between Temple and Belton.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—An extension of this line to Saratoga Springs, Utah, is being considered.

Everett Railway, Light & Water Company, Everett, Wash.—It is reported that this company plans to extend its line in Lowell.

Washington Water Power Company, Spokane, Wash.—This company will extend its Bonne Avenue line as soon as it receives a franchise from the Council for the extension in Spokane.

Wheeling (W. Va.) Traction Company.—Work has been begun by this company on the extension to Warwood.

SHOPS AND BUILDINGS

British Columbia Electric Company, Vancouver, B. C.—This company has awarded a contract to the Westinghouse, Church & Kerr Company to build a new carhouse at Fourteenth Avenue and Main Street in Vancouver. The cost is estimated to be about $300,000.

Washington Railway & Electric Company, Washington, D. C.—Plans are being made by this company to expend about $3,000 on repairs at its carhouse at Tenth Street and Florida Avenue, N. W., in Washington.

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—This company is asked to consider plans to remove its carhouse on North Park Street in Bloomington.

Public Service Railway, Newark, N. J.—This company has awarded the contract to the Hedden Construction Company to build its new eight-story terminal building in Newark. Provision is made for every department of the various Public Service Corporation activities. Including the subway, the concourse, which will be at the ground level, and the elevated train floor, the new building will provide nearly 9 acres of floor space. Above the elevated train floor the structure will rise six stories, all of which will be used by the corporation and its affiliated railway, gas and electric companies.

Piedmont & Northern Railway, Charlotte, N. C.—Plans are being made by this company to build a new depot and warehouse in Spartanburg. The structure will be 108 ft. x 110 ft. The cost is estimated to be about $40,000.

Ohio Electric Railway, Cincinnati, Ohio.—Plans are being made by this company to build a new depot on East Main Street in Newark.

Montreal & Southern Counties Railway, Montreal, Que.—This company has received permission from the Montreal Council for improving the city terminals. The company will be allowed to cross McGill Street and establish the terminal on Youville Square in Montreal.

Utah Light & Railway Company, Salt Lake City, Utah.—This company has plans in preparation for the erection of a new freight and passenger terminal station south of the general office building on West Temple Street in Salt Lake City.

POWER HOUSES AND SUBSTATIONS

Southern Iowa Railway & Light Company, Centerville, Ia.—One 200-kw, 600-volt, three-phase, sixty-cycle, 1200 r.p.m. rotary converter has been ordered by this company from the Westinghouse Electric & Manufacturing Company.

Detroit (Mich.) United Railway.—Plans are being made by this company to build a new power plant in Detroit. Contracts for the work will soon be awarded.

Northern Ohio Traction & Light Company, Akron, Ohio.—One 5000-kva, three-phase, sixty-cycle, 22,000-volt high tension, 2300-volt low tension O. I. W. C. transformer has been ordered by this company from the Westinghouse Electric & Manufacturing Company.

Lake Shore Electric Railway, Cleveland, Ohio.—An order has been placed by this company for three 185-kva, single-phase, twenty-five-cycle, 17,350-volt high tension, 456-volt low tension O. I. S. C. indoor transformers and one 15-kw induction motor generator set for exciter service. This apparatus will be installed by the Westinghouse Electric & Manufacturing Company.

Hershey (Pa.) Transit Company.—This company has completed the addition to its substation in Hershey.

Northern Texas Traction Company, Fort Worth, Tex.—This company will install at its power house in Fort Worth one 1000-kw, 600-volt, six-phase, twenty-five-cycle, 750 r.p.m. commutating pole rotary converter; three 367-kva one-phase, thirty-five-cycle, 15,000-volt O. I. S. C. transformers. The apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

Charleston (W. Va.) Interurban Railway.—This company has placed an order for one 300-kw, 600-volt, three-phase, sixty-cycle, 1200 r.p.m. rotary converter; three 110-kva, sixty-cycle, OISC transformers, 6600-volt high tension to rotary and one switchboard to control same. The apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

Manufactures and Supplies

ROLLING STOCK

Empire United Railways, Syracuse, N. Y., is in the market for twelve interurban cars.

Rio De Janeiro (Brazil) Tramways is reported as expecting to purchase 250 cars.

Connecticut Company, New Haven, Conn., will order within the next few weeks about ninety passenger cars.

Santiago (Cuba) Tramways is reported as having ordered about twenty-five open cars from The J. G. Brill Company.

Albany Southern Railroad, Rensselaer, N. Y., is expecting to purchase one express car and snow-plow and ten 80,000-lb. freight cars.

Canadian Northern Railroad, Toronto, Ont., has ordered six city passenger cars from the National Steel Car Company, Hamilton, Ont.

Third Avenue Railway, New York, N. Y., has ordered twenty-five additional low-level, single-truck, radial axle cars from The J. G. Brill Company, thus making a total of forty-nine cars of this type ordered.

Springfield (Mass.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of July 4, 1914, as expecting to purchase ten city passenger cars, has ordered these cars from the Wason Manufacturing Company.

Worcester (Mass.) Consolidated Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of July 4, 1914, as expecting to purchase ten city passenger cars, has ordered these cars from the Osgood Bradley Car Company, Worcester, Mass.

New York Municipal Railway, Brooklyn, N. Y., has been authorized by the Public Service Commission, First District of New York, to purchase 100 additional subway car bodies similar in design to those ordered at the beginning of the year. It is understood that the order will be placed with the American Car & Foundry Company.

Greeley & Denver Railroad, Greeley, Col., noted in the ELECTRIC RAILWAY JOURNAL of July 18 as expecting to purchase two single-truck motor cars, has ordered these cars from the American Car Company. The cars will be mounted on Brill No. 21-E trucks and will be equipped with GE electrical equipment.

Jersey Central Traction Company, Keyport, N. J., has specified the following details for the six center-entrance prepayment cars which were recently ordered from The J. G. Brill Company:

Seating capacity.....50	Couplers ..Brill channel iron
Bolster, centers, length.28 ft.	Curtain fixtures.Natl. L. W.
Length over vestibule, 43 ft. 2 in.	Curtain material...Pantasote
	Destination signs.....Hunter
Width over sills...8 ft. 6 in.	Fare boxes.....International
Body .....composite	Fenders .....Philadelphia
Interior trim.....cherry	Gongs .....Brill Dedenda
Headlining .....Agasote	Hand brakes .....Brill
Roof .....arched	Heaters .....Consol.
Underframe .....metal	Headlights .....Neal
Air brakes .....West.	Motors.....4 West. 307-C
Axles .....hammered steel	Sanders .....Ohio Brass air
Bumpers, Brill angle-iron, Hedley anti-climbers	Sash fixtures .....Brill
	Seats .....Brill Winner
	Seating material .....cane
Cables .....West.	Springs .....Brill
Car trimmings.....bronze	Track scrapers .....Brill
Conduits and junction boxes, West.	Trolley catchers .....Wilson
	Trucks....Brill 27 M.C.B. 2X
Control .....West.	Wheels .....Midvale

TRADE NOTES

Graphite Lubricating Company, Bound Brook, N. J., regrets to announce the death of its president, Charles H. Libbey, on July 20, 1914.

V. D. Stearns, who has been assistant sales manager of the Lord Manufacturing Company, Brooklyn, N. Y., for the past four years, announces his resignation from this company, effective Aug. 15, 1914.

Naugle Pole & Tie Company, Chicago, Ill., has appointed Laurence E. Morier in charge of the new office which the company has opened at 21 South High Street, Columbus, Ohio. Mr. Morier has been affiliated with the company for the past nine years, having started in the capacity of timekeeper and assistant foreman in the Chicago yards. After three years of this work he was transferred to the North, acting as assistant to the superintendent of Minnesota operations. He was later recalled to Chicago and made a salesman.

Union Switch & Signal Company, Swissvale, Pa., at a recent meeting of its board of directors decided upon certain changes in the business policy of the company and these brought about a number of changes in the personnel of the management, in addition to those which were mentioned in the ELECTRIC RAILWAY JOURNAL of July 25. W. H. Cadwallader has been appointed general manager of the company at Swissvale, Pa. Mr. Cadwallader came to the organization about twenty-four years ago as an office boy. Since then he has worked his way up step by step through various departments by constant attention to business, until he was made assistant to the general manager about a year ago. During the recent changes in the management, he received the promotion to his present position. J. S. Hobson, who had formerly charge of the Western district with headquarters in Chicago, has been appointed as acting sales manager with headquarters in Swissvale, Pa. A. Dean has been appointed to take charge of the Chicago office. All members of the New York office not directly connected with the Eastern sales district will be transferred to the Swissvale office, where hereafter the head sales department will be located. The Eastern sales office at 30 Church Street, New York City, will be in charge of G. A. Blackmore.

ADVERTISING LITERATURE

Goldschmidt Thermit Company, New York, N. Y., has issued a postal showing an interesting illustration of welding repair work done on a large steel crankshaft.

National Tube Company, Pittsburgh, Pa., has issued the second edition of its "National" Bulletin No. 13, which describes and illustrates its iron body brass mounted wedge gate valves.

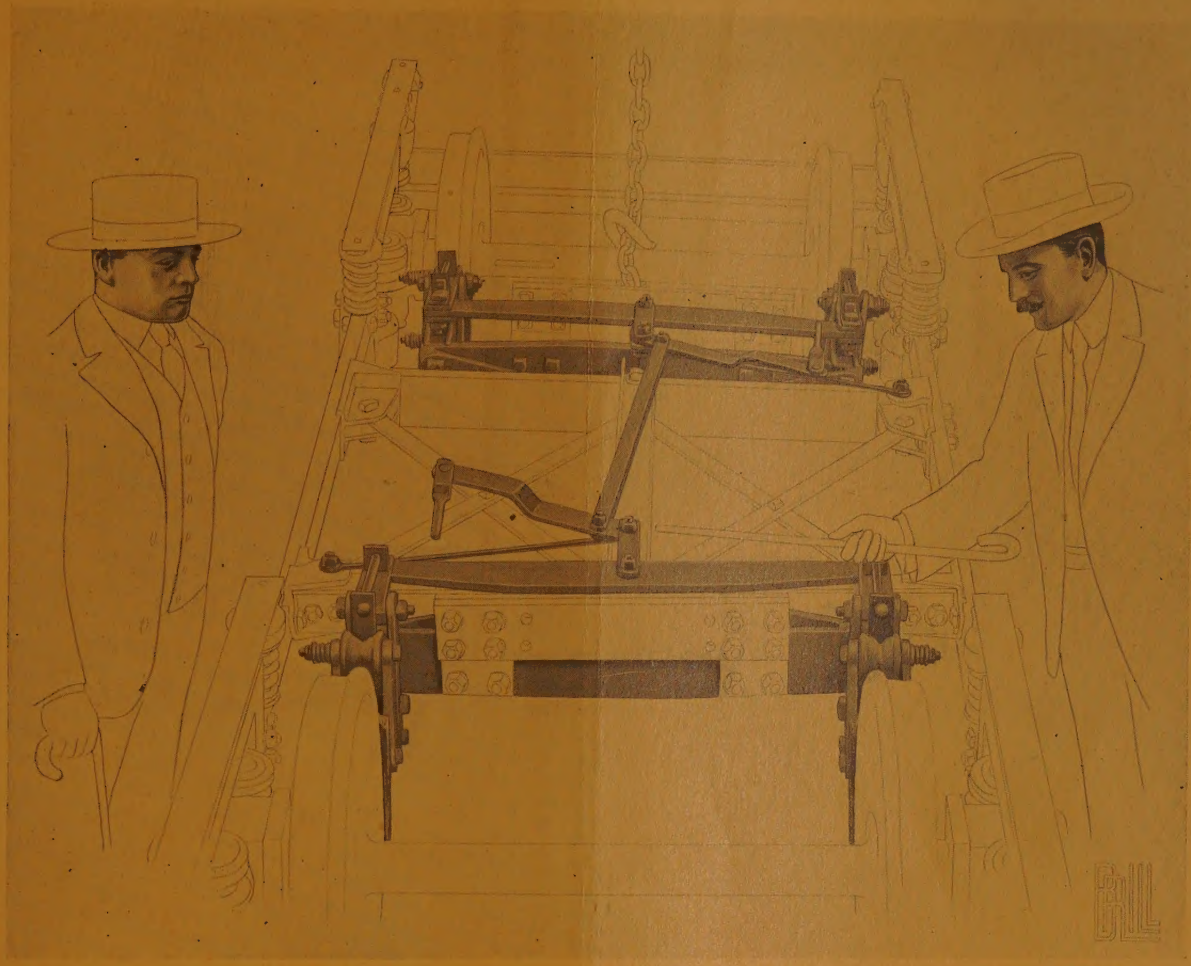
Chicago Savings Bank & Trust Company, Chicago, Ill., has issued a fifteen-page booklet entitled "A Promise to Pay." This gives a very interesting discussion on the subject of bonds, taking up in turn the definition of the word "bond," the different classes and forms of bonds and the right and wrong ways to buy bonds. The booklet mentions three factors in bond investment, viz.: security, convertibility and interest return, and closes with an outline of the work of the bond department of the bank.

International Steel Tie Company, Cleveland, Ohio, has issued bulletin No. 2, illustrating the most recent development of an installation of a support for crossings at the intersection of the Union Traction Company of Indiana and the Chicago, Cincinnati, Columbus & St. Louis Railway at Muncie, Ind., and at the intersection of the Cleveland, Southwestern & Columbus Railway with the New York Central & St. Louis Railroad at Lorain, Ohio.

St. Louis Steel Foundry Company, St. Louis, Mo., has issued a catalog describing and illustrating its solid cast manganese steel track work for steam and electric railroads. The work illustrated is all machine-ground to template and dimension and is absolutely interchangeable. The types of track work described include protected heel tongue switches of standard and tadpole styles, solid manganese steel point mates, steel railway girder frogs of U-section and double and triple intersection, slot-rail and combination gauge girder crossings, steel layouts and insert castings.

Gould Storage Battery Company, New York, N. Y., has issued an attractive catalog describing its storage battery cars. The bulletin also points out in an interesting way the field of the storage battery car, its powers and its limitations, and explains the small amount of care required for its operation, its low maintenance cost and its general economy. A number of illustrations are shown of the storage battery cars equipped by this company, among them being cars of the Central of Florida Railway, Gardenas Tramway and the Third Avenue Railway. This company has also issued helpful data for figuring on the storage battery proposition in regard to results to be expected from storage battery cars.

BRILL RADIAX TRUCK



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